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Documentation and Analysis of the Clothing Worn by Non-native Men in the Canadian Arctic prior to 1920, with with an Emphasis on Footwear

By

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A THESIS
SUBMITTED TO THE FACULTY OF GRADUATE STUDIES AND RESEARCH
IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE
OF Master of Science
in
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Date February 3, 1983

Abstract

Written and visual documentary sources and surviving footwear artifacts were located and examined to establish the (1) strengths and weaknesses inherent in the use of these types of documentary evidence in a study of historic cold weather clothing, and (2) clothing practices of British, American, and Canadian men present in the Canadian Arctic from 1820 to 1920. From these sources examples have been taken to construct a general picture of clothing utilization in the North. Special emphasis has been placed upon establishing the design and construction of the footwear that was worn during this period.

Data recording sheets were developed and used to record information on the material, cut, and style of footwear, the temporal-geographic context in which it was used, climatic detail on the day it was worn, detail on the expedition and the wearer, and the other articles of clothing worn at the same time. Manipulation of data was by means of the computerized Statistical Package for the Social Sciences. Historic footwear design was described and a working glossary of terminology useful to the study of North American cold weather footwear was compiled by the researcher to standardize description and facilitate discussion.

It was found that the data obtained from each type of source offered both strengths and weaknesses but even when all documentary types were considered it was difficult to

determine clo factor of historic cold weather clothing assemblies. Written materials gave the most data on clothing usage in terms of climate and temporal-geographical context. Written and visual documents used together were necessary to establish the total clothing assembly. However, only by the study of artifacts was it possible to secure sufficient detail to establish the design, materials, and construction techniques of the footwear.

American explorers placed greater emphasis on utilization of native-made clothing than the British and, generally, most of the footwear utilized was native-made. The British tended to rely on non-native clothing and footwear. However, many innovations occurred in footwear manufacture that reflected native design. Analysis of differences in clothing practices led to the conclusion that clothing style was an important aspect of non-verbal communication by explorers to sponsors and to the public in the home country.

Whether an expedition was ship-based or crossing overland was most important in determining the quantity of clothing and footwear available for use; weight of textile articles was of prime importance in all of the overland activities. Increased knowledge of principles of thermal insulation resulted in modification over time of clothing design for the cold. Native-made footwear was considered to be without equal and was obtained whenever possible for certain tasks, although a major problem was to obtain sufficient quantity of sizes large enough for the European foot.

Detailed study of the style and the physical properties of footwear furnished by the British Admiralty and native-made cold weather footwear was initiated to explore the protection that each offers under the harsh environmental conditions of the Canadian Arctic. This study of hide, leather, and fabric footwear artifacts was conducted by microscopic observations.

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I. Introduction

Melville (1885, pp. 38-39) illuminates the dilemma of many early expedition leaders in explorations of the far north.

> As far as moccasins were concerned, there was not a man in the working force at the end of the first three weeks who wore a tight pair on his feet. Traveling in summer-time through the water and wet snow, the rawhide softens to the consistency of fresh tripe, and then--what with the hands on the drag-rope and the slipping of feet on pointed ice--the moccasins are soon gone. Many, many times after a day's work, have I seen no less than six of my men standing with their bare feet in the ice, having worn off the very soles of their stockings. Nor would it have been possible to avoid this, since we could not have carried enough "oog-joog" skin, of which moccasin soles are made, to have kept along our boats in repair. Many devices to which we resorted in order to keep our feet off the ice. Then we tried the leather of the oar-looms, but it was too slippery, as was also the sheet-rubber, which some of the men had thrown away. We used canvas; sewed our knap-straps into little patches for our heels and the balls of our feet; platted rope-yarns, hemp and manilla into a similar protection, with soles of wood; and platted whole mats the shape of our feet. A large number marched with their toes protruding through their moccasins; some the "uppers" full of holes, out of which water and slush spurted at every step. Yet no one murmured so long as his feet were clear of the ice, and I have here to say that no ships' company ever endured such severe toil with such little complaint. Another crew, perhaps, may be found to do as well; but better--never.

The emphasis on energy conservation and outdoor recreation that has surfaced the last few years has made common the discussion of "cold weather clothing" in the media. Numerous articles have been published in the popular press to provide hints on efficient ways to dress in cold weather (e.g. Pothier, 1980; Colby, 1976).

With the advent of new synthetic fibers and new understanding of biological requirements of human adaptation to critical thermal conditions, textile technology has brought about many new concepts in the development of total clothing systems. Sophisticated apparel exists for fire fighting protection, for travel in space, and for the rigors demanded of clothing in various other occupations; yet extreme cold continues to present problems in creating appropriate design for satisfactory arctic clothing, especially footwear. Participants at a recent Canadian military arctic survival training program on Cornwallis Island in the High Arctic suffered from frozen toes during the course of a five day program (Bruhn, 1980); the -67 C temperatures that they experienced proved their footwear inadequate. The American military, too, recognizes it must continue to seek modifications of materials and style of arctic footwear. The U.S. Marines while conducting "cold weather practice manoeuvres" in Norway, in 1980, found that their mobility was a third of that of the Norwegians because of the packs and snowshoes they used and because U.S. combat boots were of a type that required five or six changes of socks a day (Lowther, 1980). Lt. Col. A.P. Richmond (1964, p. 260) noted that the northern military man must wear or carry almost 50 pounds of clothing to keep warm.

If expeditions to the Canadian Arctic today must experience such difficulties one wonders how adventurers, British Naval men, and others survived in the Arctic a century or more ago. Lacking today's technological knowledge of fibers and fabrics one wonders about the clothing types that were devised to survive in the extreme cold. What sort of footwear was being utilized by explorers to the north? What part did specialized footwear play in the total cold weather system utilized by non-native men before 1920 in the Canadian Arctic?

A. Study objectives

The first objective of this exploratory study was to locate and record sources of written information useful in the documentation and analysis of clothing systems utilized by non-native men in the Canadian Arctic prior to 1920. Because this expedition clothing would have been utilized a minimum of 60 years ago the study is most definitely related to historic costume. Yet, because the majority of studies of historic costume are concerned with fashion while this study is concerned primarily with functional/ protective clothing, useful written sources were known to be widely scattered. It was assumed at the start of the research process that data on early non-native arctic clothing would be sparse; it was recognized, however, that detailed highly technical studies on today's cold weather protective clothing would be abundant. These recent studies on functional clothing were gathered as an important source of information for this study of historic costume as the principles utilized in cold weather clothing systems today are helpful in an analysis of early expedition clothing. Bibliographic data related to these selected sources of useful publications have been filed in a data retrieval system to aid in analysis and evaluation of early cold weather clothing systems.

In addition to written sources of information, visual documents and surviving artifacts provide information on early expedition clothing. Thus, it was necessary to locate accessible depositories of visual data such as photographs, paintings, and drawings that illustrated clothing being worn in the north prior to 1920. Also, actual surviving footwear articles had to be located so that details of material, cut, and style might be described in detail.

The second objective of the study was to utilize a representative number of written and visual documentary resources from each decade (1820 to 1920) to provide a brief general survey of the protective cold weather clothing that was being worn in the Canadian Arctic by non-native men.

The third objective of the study was to evaluate the three types of documentary materials in terms of the quantity of data available from each type. To do an evaluation of historic protective clothing in sufficient detail it was necessary, however, to focus on one element in the expedition clothing repertoire so that one might make statements as to strengths and weaknesses of information obtained when utilizing written, visual, or artifact sources in a study of historic dress. Footwear was chosen as the article of clothing which, with detailed study, could provide very meaningful information on innovation and cultural borrowing at the time of first contacts between European explorers and native peoples in the Canadian north. If expedition parties could manage to keep their feet free from frostbite then the design of the remainder of the clothing assembly could be assumed to be quite satisfactory.

Using selected written and visual data and surviving artifacts, the material, cut, and style of non-native men's footwear were documented and analyzed. This analysis of footwear was devised to serve two purposes. First, it was to provide description, allowing comparison and analysis of material, cut, and style of one element of the cold weather clothing system that was being utilized by the personnel of various expeditions. Second, by the notation of different sources of data used in the study of cold weather footwear, information was obtained allowing comparison of written, visual, and artifact sources.

B. Assumptions and delimitations

The total quantity of documentary sources available for a study of arctic clothing utilization was known to be vast and to focus on footwear alone was a large undertaking. For this reason three delimitations were generally applied in selecting expeditions for study, that is, each expedition met certain geographical, chronological, and cultural criteria for inclusion in the study.

The first criterion was that the expedition ventured north of the Arctic Circle in that region that is under Canadian sovereignty today. This is not to imply that all lands north of the 67 parallel are constant in landscape and environmental conditions and provide access to similar resources. The arbitrary line that was drawn for this study does not follow physiographic and ecological zones; rather, the study area incorporates climatic, vegetational and cultural diversity. Even though only expeditions north of the Arctic Circle were emphasized, by utilizing both eastern and western portions of the north it became possible to balance, to some extent, the number of parties that travelled through the boreal forest of the Mackenzie River Drainage and the whalers on Herschel Island with the large number that only encountered tundra conditions of the eastern Arctic. By eliminating Hudson Bay from the study and, thus, the many supply voyages and whaling ships that frequented Hudson Bay, it was possible to survey European clothing practices on both the tundra and in the boreal forest yet work with a manageable study population.

A few exceptions to this have been included in the study. For example, some British and American expeditions bent on exploring the Canadian Arctic were found to use Greenland as a base and for procurement of supplies. Also, expeditions such as the Ziegler Polar Expedition of 1905, which was American funded and American crewed, but left from Norway, or the ill-fated ship Karluk, funded and supplied by the Canadian Government to study the western Arctic, but which went off course and did not reach Canadian territory, have been included in the study. To have arbitrarily excluded expeditions such as these from consideration would have eliminated much useful information on expediting practices.

The second criterion was that the expedition was present in the Canadian Arctic prior to 1920. This date was chosen to be in accordance with the work of Cooke and Holland (1978). After intensive research these arctic archivists have compiled a chronological list of all known expeditions into northern Canada prior to and including the year 1920. The date 1920 was a reasonable boundary because after this time the number of expeditions into the Arctic multiplied rapidly and, secondly, because the advent of travel by airplane into the north greatly modified the type of expeditions that ventured forth.

The third criterion for inclusion, is cultural, that is, that the expedition was of British, English Canadian, or American origin and that the first person narratives that have resulted are published in English. This delimitation was necessary so that the narratives, visual materials, and artifacts could be studied within the time scheduling and funding that were allocated for the study.

Certain assumptions were necessary in conducting this study. The field of Home Economics is concerned with all aspects of human ecology and it becomes difficult, if not impossible, to extract certain elements to be studied in isolation. Certainly this is the case with arctic clothing. There is a triad of factors interacting together, that is, the environment, clothing, and man. Certain qualities of the environment are always in operation. There is variation in temperature, relative humidity or moisture content of the air, and air movement which includes: the rate, direction, and variability or turbulence; also important is the radiant heat present from the sun or other sources of radiation (Fourt and Hollies 1970, p. 9). There is certainly variation from year to year in the climatic conditions in the Canadian north. For the sake of this study, however, variation in climatic factors is treated seasonally and by general ecological areas; major climatic changes over time or variation from year to year are not taken into consideration. Climate over the decades is treated as constant.

Secondly, for the purposes of this study, the assumption is that all men react to cold in much the same manner. Much literature strongly refutes, this, see, for example, "Individual differences and tolerance to cold" (Findikyan and Sells, 1965, pp. 22-28). Adequate nutrition is highly important in withstanding cold and so, too, is cold acclimatization. It appears that in certain cultures the whole body has become relatively acclimatized to cold. An example often cited is the Australian aborigines who sleep naked at below freezing temperatures or the Yahgan who lived in Tierra del Fuego and wore practically no clothes although the mean annual temperature was 6 C. In contrast, the Inuit does not appear to show acclimatization to cold; instead he seems to create his own microclimate around his body by the clever use of well designed clothing (Rogers and Sutherland, 1971, p. 2). The well-being of the individual is dependent upon striking a balance between energy production and energy exchange with his environment. This energy balance must be maintained within the limits of tolerance for heating and cooling the body. This study considers clothing which intervenes between body and environment in maintaining energy balance but no differentiation is made between people of varied origins as to their physiological responses to cold. While simplistic, the physiological response to cold and the need for protective clothing will be assumed similar for Inuit, Indians, Europeans and Blacks in the Canadian North.

Sir John Ross (1835, 1969 reprint, pp. 196-202), writing in 1829, noted how men chosen for arctic expeditions must have the proper physiological makeup to generate sufficient heat to stay warm and he also implies that the type and amount of food available will be reflected in clothing comfort. Sir John Franklin (1969, p. 424), travelling in the 1820s in the western Arctic, noted that there was a very strong correlation between sufficient food and adequate clothing saying "During the whole of our march we experienced that no quantity of clothing could keep us warm whilst we fasted, but on those occasions on which we were enabled to go to bed with full stomachs, we passed the night in a warm and comfortable manner." Clearly, it would have been ideal to consider clothing usage in terms of total subsistence but this would have gone far beyond the scope of the proposed study. Instead, footwear was analysed on the basis of its material properties while factors such as individual physiological differences, health, and nutritional level, all of which do influence the degree to which footwear has sufficient insulative properties, were assumed to be constant.

Fourt and Hollies (1970, pp. 1, 56) see three interrelated elements in the clothing system: the mind and body of the person, the material properties of the clothing, and the clothing design. While each of these factors is taken into consideration, the mind, i.e., the psychology of dress, is treated only briefly in terms of choice of clothing for arctic usage by men conscious of difference in role and rank. Materials and source of materials are important considerations in this study, but the biophysical aspects and highly technical aspects of thermal properties of materials are assumed to be beyond the scope of the study. Information on the material, cut, and style of explorers' footwear has been gathered and recorded in a manner that is meant to be useful to the social scientist who foresees using changes in style of clothing as evidence for innovation, cultural borrowing, and culture change.

C. Justification

Research in Home Economics is most often of an applied nature. Historical documentary research falls into the category of both pure and applied research for it contributes to an understanding of society, contemporary peoples, and economic practices. Skjelver (1971, p. 112) has called for the use of the historical method to strengthen the field of Home Economics in the academic world and to create ties between home economists and other researchers in various disciplines. A historic clothing study such as this must clearly build upon the research of historians, anthropologists, geographers, and others who seek to document the activities of people in past generations. It also must make use of the data that have been gathered in the area of textile research and engineering.

James Laver (in Rubens 1967, pp. xiii-xiv), a well known scholar of clothing, has noted that few histories of costume have shown concern with men's clothing but rather have emphasized the fashion of western women. This study of the clothing history of non-native men in the Arctic does not focus on the history of clothing fashion but, rather, is concerned with functional/protective clothing. Little research has been conducted on the clothing utilized by men involved in specified occupations; certainly this is the case with the arctic explorer.

This study is intended to add to the body of knowledge on functional clothing which is becoming an important area in clothing and textiles research. It is also hoped that a study on footwear as one aspect of the clothing system of early explorers can contribute to our understanding of the cultural role and meaning of historic costume as well as to our understanding of the activities that are part of the heritage of the Canadian North. Possibly the study can lay a partial base for future clothing studies related to the history of functional clothing in Canada and its relationship to environmental conditions.

D. Definitions

The plan for research required using written sources, visual sources, and surviving artifacts to study the cold weather clothing systems, especially the material, cut, and style of the footwear worn by non-native men. Written sources are defined as journals, first person reports, diaries, letters and other written materials that were compiled by the explorers who experienced first hand travel north of the Arctic Circle. This is not to imply that all written sources available were utilized.

Visual sources are defined as illustrative materials such as sketches, engravings, paintings, or photographs, whether they are included in a published account or available elsewhere, that were created by a person who traveled north of the Arctic Circle.

Surviving artifacts are those articles of clothing and footwear that were actually utilized by non-natives in the Canadian North during the time period under consideration.

"Cold weather clothing systems" are considered to be the total attire worn by the individual under harsh environmental conditions in any cold region of the world; this includes head gear, inner and outer wear, footwear, and any significant accessories such as goggles, snowshoes, skiis or other articles worn on the person. The terms clothing assembly and clothing ensemble also designate the total attire worn by the individual. The term footwear, however, is limited to the immediate covering of the foot such as socks, insoles, and the boot. It does not include snowshoes, skiis, or other items that do not add to the insulative properties of the foot covering.

"Material" is concerned with the products from which the clothing article is constructed and the necessary processes by which the raw materials are treated before being made into the article of clothing. "Cut" and "style" both fall into the area of design. The term "cut" refers to the shape and proportions of pieces that make up the article of footwear, that is, for example, the relation of sole to upper, the height of the boot, the diameter of the leg cylinder, placement of seams or, in other words, the "pattern pieces" of the footwear in question. The term "style" is used in a much broader sense so as to incorporate the manner of execution and final product when completed. Style would include choice in sewing stitches, types of seams, added coloration, types of braid in drawstrings, ornamentation, and other various decorative elements.

The study separates non-native and native peoples. Non-natives are persons that are not of Inuit or Canadian Indian extraction and have their home or affiliated institution (such as would be the case with permanent Hudson's Bay Company personnel) on the outside of the Canadian Arctic. This label "non-natives" applies to people of a variety of nationalities and does not imply that the persons are Caucasian. For example, many Black Men were present in the Arctic and actively involved in whaling and manning ships. Native people, by contrast, are considered to be only those Indians and Inuit who reside for a good portion of the year north of the Arctic Circle.

The terms Inuit and Eskimo are used interchangeably; although in Canada Inuit is the preferred name, the word Eskimo has been used as the culturally descriptive term in most written reports compiled at the time under consideration. For the sake of clarity, then, it is often necessary to use the name Eskimo; no disrespect is intended.

II. Relevant Literature

A. Outline of literature discussion

Discussion of literature relevant to a documentation and analysis of explorers' clothing systems used in the Canadian Arctic prior to 1920 will begin with mention of several general approaches to the study of historic costume. The point will be made that most studies of historic costume emphasize fashion rather than the protective/ functional approach to clothing usage. Two approaches to the study of present day cold weather clothing systems will be discussed and studies that emphasize the material, cut, and style of clothing designed for very cold climates will be cited. Because the clo unit is useful in summarizing the protective aspects of various garments it will be briefly described. Several sources of information on native clothing design will be presented. The chapter will then be concluded with a brief discussion of the published sources highly relevant to the procedural plan for this study.

B. Functional clothing

The purpose of this study has been to emphasize the functional/protective aspects of clothing usage. Thus, while numerous studies of costume history and fashion offer useful models for the study of historic costume, each has had a slightly different research goal.

A review of often cited studies in historic costume illustrates the fact that the goal is often to present pictorial representations of changes in fashions. Studies by Cunnington and Cunnington (e.g. 1964; 1970) offer scholarly detailed summaries of English historic costume based on years of historic costume observations of actual garments and illustrations. The Cut of Men's Clothes by Waugh (1972) illustrates a manner of presenting a detailed description of clothing utilized in the past. She approaches the study of costume history through changes in cut and style by drawing pattern pieces of generalized costumes from the periods under consideration. Janet Arnold (1972), also, in Patterns of Fashion drafts patterns of historic costumes. Each of these authors uses a qualitative approach in seeking information for the documentation of changes in fashion. Data are obtained by subjectively studying art work, illustrations, and museum collections.

A less common method in historic costume research is the use of the quantitative approach in the study of fashion change. This approach is most notably employed by Kroeber (1919) who took measurements of clothing illustrated in fasion journals from 1844 to 1919 in order to demonstrate the relationship of actual clothing dimensions to political history. Twenty years later Kroeber and Richardson (1940) looked at changes in women's fashion over a 300 year period, again utilizing actual measurements taken from illustrative materials.

Other recent studies in historic clothing have utilized various quantitative procedures in research design. Though few studies of men's clothing are available compared to that of women's fashion change, a study by Mathews (1969) on changes in men's suits over a time-span of 50 years is relevant to this study of occupational cold weather clothing. Mathews' purpose was to demonstrate trends in men's fashionable wear by looking at predefined elements present in the tailored suit. By observing and recording the presence or absence of these characteristics she was able to define trends in men's clothing over time.

Similar to the work of Kroeber, the sort of research design utilized by Mathews was to focus on certain elements in the design or construction of the garment and record how these elements were modified over time. Clearly, one goal of most historic costume research is to focus on trends or changes over the years in fashionable clothing. Less frequent are studies that emphasize occupational or work clothing. Very useful to the proposed project is Copeland's (1977) Working Dress in Colonial and Revolutionary America, which seeks to determine the dress of working class peoples and to present accurate illustrations of non-fashionable clothing during the period from 1710 through 1810 in the Americas. Other authors have looked at the clothing of specialized segments of the population. For example, Cunnington and Mansfield (1970) have dealt with English costume for sport and recreation; Oakes and Hill (1970) have summarized rural costume. Obviously relevant to the proposed study are the specialized works on military dress. Generally, however, the various studies on military costume offer little insight into what might have been worn in unusually harsh environmental conditions.

From the costume studies that have been surveyed it appears that the research goal of historical studies in occupational/functional clothing, like studies in fashionable clothing, is primarily to illustrate cut and prominent elements of style. Documenting appearance and current style or ethnic uniqueness rather than analyzing utilitar-function is the purpose of the majority of studies in the subdiscipline of historic costume.

In contrast to this objective, the goal of this project was to consider explorers' clothing as a structural assemblage of materials. No studies of historic clothing usage have been located that look at clothing design in terms of comfort, function and appropriateness in the environment in which the clothing was intended to be used. This is one approach to the study of clothing function as defined by Fourt and Hollies (1970). As stated previously, a clothing system is viewed by these authors as three interrelated elements, that is, the material properties, the clothing design, and the mind and body of man. The study of functional clothing is organized around the balance needed for comfort and this concept of balance between body and environment is achieved by the intervention of clothing. Clothing is selected and adjusted by conscious intent to secure physiological and psychological comfort or at least as much protection from an adverse environment as possible.

Fourt and Hollies (1970, pp. 1-22) separate comfort into quiet comfort and comfort while working. The concept of quiet comfort is a body temperature that reflects "pleasantness" when the body is in an environment that causes no temperature regulatory processes like sweating, vasoconstriction, and vasodilation to occur. This state of quiet comfort is seldom possible except under what Fourt and Hollies call noncritical conditions such as might be the case in a comfortable office or relaxing drawing room. It is under noncritical conditions or during quiet comfort that clothing for most everyday activities is utilized. As Shivers (1980) suggests, both physiological and psychological comfort are considerations.

Fashion, conspicuous consumption, and the usage of clothing as symbol are not difficult under conditions of quiet comfort. Choosing varying styles of dress is an important component of self confidence and being at ease. Quiet comfort is thus more complex than merely achieving thermal balance because choice of clothing may be the means for ego assurance. Dressing in some certain manner may be the way a person chooses to enhance self-concept within a particular social group or social situation. Studies of clothing usage to achieve psychological comfort under noncritical environmental conditions are abundant in the field of clothing and textiles. Rosencranz (1972), Horn (1968), and Ryan (1966) have written extensively on clothing and human behavior. Clothing has been demonstrated to be of great significance in the presentation of self; authors such as Rees, Williams, and Giles (1975) and Schneider (1974) stress the symbolic aspects of clothing in the role/class situation in inspiring confidence and compliance.

Other than the few studies already cited on work and rural clothing, no studies have been located on historic clothing usage under critical environmental conditions such as exist in the Canadian Arctic. Under critical conditions there may be no "comfort" in any sense of the word (Fourt and Hollies, 1970, p. 5) no matter the material, cut, and style of the clothing chosen. During sport, military duty or exploration man seeks to push his effectiveness to extremes so as to increase performance in difficult environments. Under critical conditions, clothing cut and choice of materials become highly important and effectiveness of clothing variations may be the critical factors creating certain tolerance time while working in the cold rather than creating comfort. As noted by Fourt and Hollies (1970, p. 5), the very fact of discomfort may increase survival time by acting as a stimulus to behavioral adjustment such as lighting a fire or constructing a shelter.

One wonders whether the reason that few studies of clothing utilized under critical conditions exist may be due to the fact that the majority of studies have used data derived from visual sources such as drawing and paintings by well known artists. The psychological aspects of dress may present a particular problem in ascertaining what was actually worn by men on arctic expeditions. It may be that under critical conditions the clothing that was worn was seldom recorded or illustrated in drawings, engraving, and paintings. Rather, formal attire that really would be worn only under quiet comfort conditions may be illustrated as being worn under critical conditions. In "The Study of Dress in the Works of Old Masters" Newton (1965) warns that the artist unconsciously inhibits the people that he portrays and can not help but unknowingly reflect his own values in the work. Artistic license must be a consideration in the study of visual documents.

Anawalt (1975) discusses the difficulty of rendering pictorial data into comparable units of analysis. One must ask how accurate are illustrations of clothing in the documents? How valid is a particular costume depiction? How much variation or lack of variation can be traced to literary and artistic license? What information is being withheld? The same questioning is valid regarding written documents, photographs, or in an analysis of surviving artifacts. The use of data obtained from the three different data sources, i.e. written, visual, and artifact, has thus been employed in this study to provide a balance in the portrayal of clothing usage so that more accurate generalizations can be made.

C. Cold weather clothing systems

There are two main approaches to the study of cold weather clothing systems. The first approach is to work with living subjects and to measure physiological responses that occur within the body while varying types of clothing are worn under specified environmental conditions. The second approach is to measure, compare, and analyze the different variables in the clothing itself that has been designed for usage in cold weather conditions. Ancillary to this second approach, in a sense, are the descriptive studies of the clothing of northern native persons, this being a clothing system that is considered by many experts to be ideal for the far northern environment.

The classic work on the relationship of human physiology and clothing usage is Newburgh's (1968) The Physiology of Heat Regulation and Science of Clothing. An update to this work and a study which emphasizes research that has been sponsored by the U.S. Army Laboratories is the monograph by Fourt and Hollies (1970). Much literature exists on the development and use of cold weather clothing systems and extensive bibliographies are provided by several authors; see Alexander (1962), for example. Because much of the research in this area was conducted in the 1940's for military purposes the review article by Cena and Clark (1978) on "Thermal Insulation of Animal Coats and Human Clothing" is an update of more recent literature.

Throughout time man has protected himself against a cold environment by building adequate shelters and wearing sufficient clothing. In fact, it is only by creating his own micro-climate within clothing that man can survive severely cold weather. As many authors note, however, it may be the protection of the extremities, i.e. the feet and hands, that may be the deciding factor in surviving arctic conditions (Carlson and Thrush, 1960a). A thorough discussion of frost bite and its debilitating effects is covered by Viereck's (1964) collection of papers. Hedblom (1964), in a paper included in this collection, discusses the requirements for hand, head, and footwear that are necessary for adequate protection and outlines tailoring procedures that are most appropriate in manufacturing clothing for the extreme cold, noting that Eskimo clothing design principles should be followed so as to avoid designs which restrict circulation. The point is made by many that the success or failure in extreme cold may be a function of the degree to which hand and footwear is adequate. Thus, many studies of the extremities exist in the literature. For example, Fisher (1957) has published the study Functioning of the Hands in Cold Climates. An important annotated bibliography on protection of the extremities in extreme cold has been compiled by Carlson and Thrush (1960b); this study emphasizes cold acclimitization rather than protective clothing. Among the studies on physiology and footwear are those by Folk and Peary (1951), Croft and Roberts (1940a, 1940b), Milan (1965), Alexander (1961), and Davis (1965).

Clearly much cold weather clothing research that emphasizes physiological responses utilizes measurements that require living subjects. Thus, while inferences can be made to clothing systems utilized in the past, few of the research techniques can be directly employed in historic costume studies. Direct interaction of clothing and body response appears impossible to determine for past generations.

More immediate to this present study of the historical aspects of arctic clothing systems are studies that relate to the differences in the material, cut, and style of clothing that has been actually used as arctic cold weather clothing.

Studies that concern the physical properties of clothing materials, cut, and style in relation to comfort provide more information of direct use in evaluating the success or failure of clothing systems utilized by early explorers of the Canadian Arctic. Fourt and Hollies

(1970, pp. 115-175) list various physical properties that are important in an analysis of comfort. These are thermal transmission or resistance, water vapor diffusion resistance, water transport in clothing materials, water holding properties, thickness, surface properties of fabrics, porosity and permeability properties, water and oil repellancy, radiation exchange with clothing materials, stiffness and bending properties, clothing fit, fabric sliding properties, static electricity, and the number of internal spaces in the clothing.

Just as research utilizing actual responses of living people would be an unlikely research tool in historical textile research, many of these physical properties would be impossible to determine from documentary sources. However, based upon the findings of Rogers and Sutherland (1971) thickness and the number of layers worn are by far the most important factors in establishing the insulative value of total clothing systems. In fact, these researchers found that by merely counting the layers of clothing one could estimate the clo value of the given attire nearly as accurately as when detailed heat loss experiments were run on the clothing system. This observation should play an important part in any analysis of historical footwear and cold weather clothing.

The clo unit is a means of discussing the thermal insulation of clothing. While it has various specific definitions (Vegti and Solli, 1961, p. 10; Fourt and Hollies, 1970, p. 8), for comparative purposes one clo unit equals one clothing layer and may be thought of as the thermal insulation in a business suit worn in Toronto, a wool military uniform, or a top coat. It has obvious applications in the study of historic cold weather clothing since it often may be possible to count actual layers worn in clothing utilized in the past, whether through written descriptions or study of actual surviving artifacts. Since studies exist on the clo value of various materials that were utilized to construct northern clothing and footwear, one is sometimes able to infer the thermal insulation provided by a particular piece of clothing if materials used in its construction can be identified. For example, Griffin, Hammel, and Rawson (1956) have tested the insulation value of various furs and thus have established clo values for husky dog pelts, snowshoe hares, red fox, caribou, wolf, and other animals pelts and have gone on to compare thermal insulation provided by natural furs with that of artificial furs and synthetic fabrics.

When total clothing ensembles can be ascertained it is possible to assess the adequacies or inadequacies of the clothing utilized by early arctic explorers. This can be done by determining the number of layers and the materials from which clothing was constructed; certainly this should be meaningful in a study of footwear. By looking at current studies on the relationship of varying types of footwear and the occurrence of trenchfoot and frost bite one also may be able to analyse the adequacy of early footwear based upon written descriptions left by the early explorers.

Studies that are concerned with materials for cold weather clothing systems include "Leathers for Polar Footwear" by Lloyd (1940), "Thermal Properties of Furs" by Hammel (1955), Convoy's (1951) account of the physical properties of caribou and seal skins, and the study by Manning and Manning (1944) of skins and clothing of the eastern Canadian Arctic. A number of recent studies discuss technological developments using modern fabrics and fibers for cold weather clothing. For example, nylon pile fabric clothing is discussed by Ayer (1953). Torii (1968) and Heine (1968) also speak of technological developments useful for arctic conditions. Law (1963) has discussed the use of woollen garments in the Antarctic. Rogers and Sutherland (1971) have studied and described the effectiveness of specified clothing utilized by the Trans-Antarctic Expedition of the I.G.Y. (International Geophysical Year) expedition in 1957-58.

However, much of the clothing utilized on recent expeditions was not available prior to 1920. Early studies of clothing and materials are in many ways more immediately relevant when seeking to discover clothing usage in the past. For example, Stevenson, in 1904, published his study on "The Utilization of the Skins of Aquatic Animals;" a study of the waterproofing of fabrics was done by Mierzinski in 1921. Also of interest is Hill's (1918) study on the science of clothing and the prevention of trenchfoot, and the history of waterproof footwear published by Shidrowitz and Dawson (1952).

The cut of arctic garments has been discussed less by researchers than have materials. Nonetheless, Dusek (1958) has studied the ways in which clothing restricts body movement from a design point of view in his article "Encumberance of Arctic Clothing." Daniels and Madden (1956) have looked at the relation of clothing design to energy used in handling certain chores such as cutting blocks of snow. Kennedy (1957) has looked at the functional distribution of insulation in glove design for the Arctic.

Just as the functional aspect of clothing design has often been ignored by researchers of historic costume, the style of arctic garments, that is, the decorative manner of execution in creating the clothing, is generally ignored by researchers of functional/protective clothing. Fourt and Hollies (1970, p. 3) typify this attitude in their own work stating that their discussion of clothing is "from the point of view of utility and function, not from the point of view of appearance or current or historic or ethnic style." Nonetheless, because clothing comfort does involve psychological comfort, decoration and ornamentation do have an important function in a study of clothing utilization in the Arctic. Hedblom (1964,

p. 89) puts this in perspective by saying "Polar clothing must be, in order of importance, protective, comfortable (light, loose, simple), of minimum bulk, easy to clean and durable. 'Style' or tradition must be sacrificed if it interferes with those factors."

D. Native clothing and footwear

Information describing Inuit and Indian clothing systems is found in early ethnographies. The anthropologists who went to the Canadian Arctic with the purpose of describing the culture of northern peoples provide much detail. Franz Boas (1888, 1967 reprint) made extensive observations himself and also utilized the observations of earlier travelers in discussing Eskimo life in the Cumberland Sound-Davis Strait region in the 1880s. He later (1901-07) studied the Eskimo of Baffin Island and Hudson Bay. In 1900 A.L. Kroeber published a study of the Eskimos of Smith Sound for the Museum of Natural History. Hrdlicka (1910), as well, described the Central and Smith Sound Eskimos. Diamond Jenness (1928, 1961 reprint), while acting as ethnologist with the Canadian Arctic Expedition from 1913 until 1916, observed Eskimos of the Cornation Gulf Region. He also made extensive studies of the Copper Eskimos (Jenness, 1923). Kai Birket-Smith (1940), who like Jenness, has made his life work the study of Eskimo culture, has published on the Central and Caribou Eskimos. Therkel Mathiasson (1928) has made a major study of the Iglulik Eskimos. Each of these anthropologists has treated clothing as one aspect of the material culture of a people. Birket-Smith (1971) in his book Eskimos, summarizes the cold weather clothing system utilized by the Inuit people. He both generalizes about Eskimo dress and distinguishes the materials, cut, and style in the different geographic regions of the Arctic.

A thorough study of arctic skin clothing is Gudmutt Hatt's (1914, 1969 translation) "Arctic Skin Clothing in Eurasia and America--An Ethnographic Study." In the study of skin clothing Hatt first considers the material and technique of clothing, that is, skin types, preparation and tanning, cutting and sewing, and the use of shoe grass for insulation in footwear. He then discusses the cut of two kinds of Eskimo dress, that of the poncho and its related forms, and the cloak and related forms. Footwear is described in detail and he outlines a possible evolution from aboriginal forms of footwear, that is, the sandal, the skin stocking, the moccasin and leggings. The sandal boot and the moccasin boot are considered to be more developed forms of footwear.

In a sense, Hatt (1969, pp. 74-104, 130-132) has developed a typology for northern footwear. He divides sandals into two groups based upon how the sandal is attached to the foot. In one type a toe string is used which goes between the two toes, usually the first and second. The other type consists of those where a lace runs through holes or loops on the sides of the sandals. Birket-Smith (1972, pp. 125-126) has observed this sort of skin stocking and loose sandal still in use by men while smooth ice hunting.

The skin stocking has widespread use in the North. Hatt distinguishes three groups of stockings, that is, where 1) the cut of the stocking is a copy corresponding to the outer boot but is made more carelessly, 2) the cut of the stocking does not follow any rules and seems to be patched together from a great number of skin pieces (the preferred material being abdominal skin of the reindeer), 3) practical considerations affect the cut, particularly so as to increase durability, thus the stocking is not a copy of the outer boot. In analyzing the cut of the stockings Hatt appears to pay most attention to the relation of the instep to the sole.

The Eskimo boot was believed by Hatt to be a combination of stocking and sandal or what he terms the sandal boot. These Eskimo boots had the sole cut slightly larger than the sole of the foot and it was bent up the whole way around the foot. The sole was then shaped and regularly gathered. Instep ribbons were fastened at the welt of the sole, being either sewn in the sole seam or pulled through the loops that are sewn in the sole seam. This lacing allowed the boot to fit tightly about the ankle. The cut of the boot leg was highly dependent on the material that was chosen. For example, if sealskin is used a median seam would occur in front, yet, no seam is likely to be present if the boot is of reindeer. The cut can also be influenced by the form of the other clothing that is to be worn.

Indian footwear differs in cut and style from the Inuit footwear just described. The Indian forms are designated as moccasins, leggings, and the more advanced form is called the moccasin boot. The characteristic common to the moccasin type is that one piece of skin covers the sole of the foot and the sides of the foot and in the back this piece of skin is gathered by a straight or T-shaped heel seam (Hatt, 1969, p. 77). This may be contrasted with the Inuit form where no heel seam is present. In conjunction with these moccasins the boreal Indians would use leggings, in fact, leggings were worn by most North American Indian tribes north of Mexico. By contrast loose leggings were worn only by Eskimo women and then only in the central coastal areas of Baffin Island (Hatt, 1969, p. 79).

The least complex form of leggings is simply materials being wrapped around the legs with no sewing necessary. The simplest form of sewn leggings is made of one piece of skin which is gathered by a longitudinal seam to create a cylinder, generally with the seam running along the outside of the leg. The northern Dene have combined their leggings and footwear with a kind of breeches (Hatt, 1969,

p. 79) to create a single clothing piece. However, the Slave, Dogrib, the Hare and the Chipewyans have combined leggings and footwear to create a kind of boot (Hatt, 1969, p. 79, quoting Mackenzie, 1801:CXX, 36, 48). In general, though, the moccasin boot form is of more importance in northern Asia than in northern Canada, with the majority of North American examples being found on the plains and the American Southwest. Separate moccasins and leggings appear to be more common in the North.

E. Footwear classification and description

The system used by Hatt to explain northern footwear, that is, the sandal and skin stocking and the sandal boot, along with the moccasin, leggings, and the moccasin boot is generally adequate for discussion of traditional native footwear. However, the classification scheme is inadequate if European-style footwear is to be included as well.

Hald (1972), in working with primitive shoes found in European archaeological sites, has divided footwear into two main types. Using Danish terminology, the type she calls "saalsko" consists of two main components, that is, an upper and a sole which are joined along the lower edge of the foot. The second type is called "hudsko." This is the hide shoe which has no separate sole but is simply a single piece of hide or skin folded around the foot, with minor additions such as a tongue, instep, gores, etc., being of no typological significance. In formulating these two types Hald has been cognizant of the work of two Norwegians, that of Schnabel (1784, cited by Hald, 1972, p. 175) who in the 18th century carried out the classification of primitive shoe types in Norway, and Falk (1917, cited by Hald, 1972, p. 175) who worked further on historical shoe terminology. Utilizing Hald's two main types of shoes, one immediately places the moccasin in the hudsko category; the categorization of Inuit sandal boots, more commonly called mukluks or kamiks, is not quite as clear cut for although the upper and sole are joined, this occurs at the top of the foot, not at the lower edge. Before one can categorize European-style shoes and boots it is necessary to consider the varieties that were being worn by European men through time.

Tracing the history of fashionable shoes, Brooke (1971) has found that shoes in the Middle Ages in England had very flexible soles with uppers that were nearly always highly decorated; shoes of the 12th and 13th century were nearly always dyed in all sorts of colors. In the 14th century, from the time of Edward III to Henry IV, piked shoes came into fashion; these were shoes with very long pointed toes. By the time of the Tudor period, from 1485 to 1602, more common were square-toed shoes with no heels. The more fashionable sort were cut very low at the sides. A favored means of decoration was a slashing of the leather so that brightly colored linings might show through. Shoes at this time were often cut very wide, sometimes nearly as wide as they were long. The toe and sides were then padded with moss or hair so as to fit the feet (Wilson, 1969, p. 102). Shoe design evolved, though, so by the end of the 18th century footwear was close fitting and decorated at the top of the foot with a large buckle.

Boots were common for riding in Tudor times. By the time of the Stuart period (1602-1714) boots had evolved to an enormous size and boot hose or finely embroidered stockings with exaggerated tops were worn in such a way that the stockings could fall gracefully over the top of the boot. One can assume that each of these footwear types was worn under conditions of "quiet comfort."

Under more critical conditions boots were worn by gentlemen for riding and by soldiers. Beginning in the 18th century fashions assumed a military air and a military style became very fashionable from the time of George I, that is, from 1714. Nineteenth century boots were of all styles, that is, heavy, light weight, high, short, plain or fancy. Under the influence of important military events, boots of the time were typed as the Napoleon, Wellington, Blucher, and Hessian (Wilcox, 1948). During the mid-1800s developments in the rubber industry made available this material for use in footwear manufacture.

Farmers and rural workers in England and America did not generally have access to fashionable leather boots in the late 18th and early 19th century. The common man more often wore shoes with laces and ties; only a few of the more affluent might have a pair with buckles. Shoes were sometimes girdled around the heel with an iron strap in the shape of a horseshoe. In wet weather, wooden pattens with iron runners were worn (Copeland, 1977, pp. 39-53). In northern England wooden clogs were often worn by the common people, while in Scotland the pampootie was common. Pampooties, still occasionally worn in the 20th century on the Scottish islands, are identical to "hudsko" found in Danish archaeological sites, in that they are constructed of a single piece of hide that is folded around the foot and held on with a drawstring placed through slits around the edge of the hide piece.

A number of popularized books on the history of fashionable footwear are available. Much of the information that has been utilized by the authors to compile the information has been derived from drawings and paintings. For this reason it was generally impossible for the writers to make detailed statements about material, cut, and style. Archaeological studies have, thus, proven more valuable in offering clues to some varieties of historical occupational footwear. When remnants of footwear are found in archaeological sites specialists can usually determine the materials from which the footwear is constructed; also, the cut is generally evident. Details of style, that is, of decoration, ornamentation, and coloration are generally lost through deterioration, however.

Existing literature on European-style footwear and the history of footwear manufacture in the United States (e.g. Thomson, 1976; Hazard, 1969) offer many insights into changes in civilian men's fashion. No studies have been located to date, however, on specific occupational footwear practices of the military or explorers to the Arctic, nor have general clothing studies that might include this information been found.

F. Previous research critical to this study.

The inspiration and much necessary research for the methodology that has been devised for this study of historic cold weather clothing have built upon the research results of several others. One important study is Winter Clothing Requirements for Canada by Auliciems, de Freitas, and Hare (1973). These authors have compiled the clo units necessary for outdoor work at various locations in Canada for each month of the year based on the climatic data recorded at 77 meteorological stations across Canada from 1957 to 1966. By calculating the approximate energy expenditures of a man who is, for example, canoeing (light activity), breaking firewood (light work), walking with a 20 kg load (moderate work), or walking with a 20 kg load in soft snow (heavy work), these authors have provided a scheme for the analysis of appropriateness of clothing if the geographic location, the month, and the type of activity being undertaken are known. Necessary clo requirements for suitable dress under certain geographic and climatic factors have been provided by this publication.

To establish whether a certain expedition was present in the Canadian Arctic prior to 1920 the book that has been constantly referred to throughout this entire study is The Exploration of Northern Canada. 500 to 1920. A Chronology by Cooke and Holland (1978). This important compilation lists the year, location, and the publications that have resulted from the observations and journals kept by men present on expeditions to northern Canada. It has been heavily relied upon as a reference in choosing expeditions for clothing study that represent different decades and different northern geographic locations.

The studies Environmental Data from Historical Documents by Content Analysis by Moodie and Catchpole (1975) and "Historical Evidence of Climatic Change in Western and Northern Canada" by Catchpole (1980) suggested a method for using written and visual communications in an analysis of historic arctic clothing. The procedures outlined by these authors suggested a method for the study of historic clothing documentation by extracting quantitative evidence of clothing usage from historical communications media. A cursory examination of published narratives and diaries from early expeditions indicated that communication to others about what was being worn, and the qualities and the faults of the clothing, was common; comments on clothing suitability or lack of suitability for the prevailing environmental conditions were often recorded in conjunction with detail on the temporal-geographical context and daily climatic factors. Thus, it appeared feasible to examine written communications to document historic arctic clothing usage. From these written documents data could also be extracted regarding the type of personal characteristics of the wearer so as to relate these variables to the clothing supply.

In the same vein, visual documentary materials also appeared to yield evidence of specific clothing usage and the context in which it was being worn. Anawalt's (1975) study of historic Pan-Mesoamerican costume was a stimulant to document historic arctic clothing usage and design through visual records. The study by Mathews (1969) was of help in devising a method for documenting and comparing changes over time in clothing design.

To be able to compare usefulness and the type of data that were ultimately obtained from each source, the archival information pertaining to the collection of clothing data sources was categorized in the manner that Catchpole (1980, p. 24) has classified sources of written evidence. The determination of the suitability of clothing assemblages that were worn in the North, however, required recording of data in a manner so that modern cold weather clothing studies could be utilized in the analysis.

A method for structuring the data collection techniques in a way that might allow inference of the clo factors of historic cold weather clothing ensembles owes much to the study Climate, Clothing, and Acclimatization by Rogers and Sutherland (1971). In this report the authors described collection of data on clothing usage by 12 men on the Trans-Antarctic Expedition of 1957-58. Data were collected on clothing, the individual, and the environment. The body was divided into sections, that is, the clothing worn on the hands, the feet, the head, the upper trunk and the lower trunk was noted. Personal characteristics of the wearer such as age, weight and fat thickness, the surface area of each subject and the calories consumed per day were recorded, along with the activity level. Activities were categorized into five levels, these being sleeping, sitting, light work, medium work and heavy work. Simultaneously, climatic data were recorded, generally at three hour intervals. Radiation and cloud cover, temperature, wind velocity and wind chill, and amount of snow drift were noted. Data were then coded onto computer cards and analysis was carried out on the clothing data to discover 1) whether a relationship existed between climatic stress and clothing worn, and, if so, on what variables the clothing worn depended, 2) why the clothing worn varied from one individual to another under similar conditions, and 3) whether there was any evidence of acclimatization to cold. Multiple regression analyses were performed on clothing and environmental data using total number of layers of clothing as the dependent variable and temperature, wind activity, altitude, cloud cover, drift, and wind chill as independent variables. Similar analyses were performed with number of layers on the hands, upper trunk, lower trunk, and feet as the dependent variables. Various comparisons were made as well as study of the acclimatization and variety of clothing usage among the men.

The footwear under consideration in the Antarctic study included duffle slippers, ankle-length woollen socks, knee-length woollen sea boot stockings, mukluk duffle inners and outers, canvas mukluks with rubber soles, felt insoles, soft leather moccasins and leather ski boots with thick rubber soles. Combinations of these were worn with various combinations of clothing for the rest of the body. The particular clothing assemblages were also tested under controlled laboratory conditions to determine the clo factor of the particular clothing assemblage; footwear was never treated in isolation and was not described in detail in the Rogers and Sutherland study.

For the sake of this present study, observations made on footwear to determine material, cut, and style have been based, in part, on the format of the accession sheets utilized by Central Museum of Northampton, England, for the cataloging of historic footwear.

Thus, while no study has been located which similarly looks at the design properties of historic cold weather footwear and clothing, this research project has drawn upon the published works of many authors.

III. Procedure

The research design and methodology of this study were developed to fulfill the three objectives stated earlier in the introduction, that is:

1. compilation of an annotated bibliography of published materials useful in the study of historical protective clothing
2. provision of a general description of clothing used in the Canadian Arctic until 1920
3. documentation and analysis of footwear worn in the Canadian Arctic prior to 1920 by non-native men.

A. Compilation of the bibliography

Utilizing resources at the library of the Boreal Institute of Northern Studies, the library of the University of Alberta, and the holdings of the Arctic Institute of North America in Calgary, an annotated bibliography of published literature useful to the study of historic cold weather clothing has been initiated.

Citations were recovered from the literature by means of manual and computerized searches. Prime resources in the manual search were The Library Catalogue for the Scott Polar Research Institute, Arctic Bibliography, Yukon Bibliography, and the KWIC Index compiled by the staff of the Boreal Institute.

Four data bases were searched by computer. The first data base to be searched was Arctic Science and Technology Information System (ASTIS) which is compiled by the Arctic Institute of North America. Three other data bases were then searched mechanically. These were Social Scisearch, America: History & Life, and the holdings of the Boreal Institute of Northern Studies. Computerized searches relevant to thermal insulation conducted by other students on the World Textiles and Engineering Index were also utilized.

From these search results current articles judged useful in a study of the historical aspects of cold weather clothing systems were then placed in a SPIRES bibliographic sub-file retrieval system.

As well as current articles on cold weather clothing, passages from early narratives and archival papers that have significant discussions on clothing utilization have been included in the bibliography. Generally these have been located while reading historical materials to fulfill the second and third objectives of the study. The development of the SPIRES file was completed under the direction of the consultants at Computing Services, University of Alberta. The bibliographic information is now stored on disk for retrieval utilizing the Visidex program (Personal Software, Inc.) on the Apple II micro-computer.

B. General survey of clothing usage

Information on clothing usage was noted in the process of gathering footwear cases. Clothing usage was recorded on the data recording sheets (see Appendix 1) by noting the garments worn on the upper trunk, lower trunk, and hands whenever this could be established. In other words, general clothing usage was recorded on the devised recording scheme only when a footwear "case" was being considered in the footwear analysis portion of the study. In several instances, however, a "case" was assigned to the clothing ensemble when the footwear itself was unrecognizable but the combination of garments worn appeared important for the study of that particular decade or group of men.

It must be recognized that many written records contained data on the clothing employed for arctic service yet did not mention footwear specifically; thus, no case number was assigned and the information was not recorded for computer analysis. Notes and drawings, however, were made on this clothing information. Thus, data have been considered decade by decade and a qualitative reconstruction of clothing utilization has been prepared based upon this. As is also true of the footwear documentation study, sources for the summary of clothing usage have been derived from the non-random selection of materials chosen for study. Using bibliographic data provided by Cooke and Holland (1978), publications were chosen so that each decade would be represented.

After completion of the pilot study which was conducted to formulate footwear data recording sheets, it was decided to read a minimum of 25 published first-hand descriptions of travel in the Canadian North prior to 1920. This was done; those sources that are cited in the discussion or that provided footwear cases are included in the bibliography. As is always true in historical research, many more sources of information have been taken into consideration than can be listed.

Utilizing the collection of arctic travel narratives, which are shelved according to year of travel in the library of the Boreal Institute of Northern Studies, all books pertaining to Canadian Arctic travel between 1790 and 1920 were scanned. Those books that appeared to offer sufficient information on footwear design to warrant assignment of at least one "case number" were read in detail. Then, in these instances, whenever footwear was mentioned in the text or the appendices a case number was assigned and a data recording sheet was completed. Only in the decade 1850-1860, the time in which numerous expeditions went north in search of Sir John Franklin, was it necessary to arbitrarily cease collecting data cases. After it was clear that British, American, and Canadian parties, travelling both in the eastern and western Arctic, both by land and by sea, were represented, the research concentrated on sources that discussed clothing utilization in other decades. Less material was available for study in some decades than others and the number of recorded footwear cases reflects this fact.

Collection of information on clothing and textiles used in the Arctic was continued until a total of 500 footwear cases was collected and information relevant to the variables on the data recording sheet was entered. At this point data collection ceased and analysis was initiated.

C. Documentation and analysis of arctic footwear

The in-depth study of change in the material, cut, and style of pre-1920 non-native men's footwear worn in the Canadian Arctic proceeded in six steps. These are as follows:

1. pilot study of selected archival respositories
2. development of recording systems for footwear data
3. coding of data obtained at pilot study locations
4. evaluation of data collection techniques
5. data recording for main study
6. results, conclusions and recommendations

The pilot study

The pilot study was conducted to aid in the development of the data recording system for the footwear study. Funding was obtained from the Boreal Institute of Northern Studies, Edmonton, Canada, to travel to various institutions to study resources unavailable in Alberta. In England, visits were made to the Scott Polar Institute where a collection of expedition clothing was examined and relevant papers of the British Parliament were read, to the Central Museum at Northampton where footwear in the historic shoe collections was studied and discussed, and to the National Maritime Museum where exhibits containing much clothing actually utilized in the Canadian North were studied.

In the United States, unpublished papers of the explorer, Stefansson, and the geologist, Leffingwell, were studied in the Stefansson Collection at Dartmouth College, Hanover, New Hampshire. Photographs and artifacts from the arctic journeys of Peary and MacMillan were studied at the Peary-MacMillan Arctic Museum at Bowdoin College in Brunswick, Maine. Art work and other illustrative materials from various arctic whaling parties were studied at the New Bedford Historical Society Whaling Museum, New Bedford, Massachusetts, the Kendall Whaling Museum, Sharon, Massachusetts, and the Maritime Museum in Searsport, Maine.

At each of these locations data were gathered on the clothing practices in the North in the different decades, by people with different reasons for being in the Arctic. Xerox copies of important archival papers were obtained. Relevant art work and photographs were photographed, and surviving clothing artifacts were sketched and photographed. Along with the collection of background material on expediting practices, approximately 125 footwear "cases" were obtained for documentation of footwear utilization. Data that could be derived from each of these footwear cases were later recorded on data recording sheets; these sheets were devised after conclusion of the pilot study tour when it was known the degree of detail one might ideally expect to obtain regarding footwear usage. These 125 footwear cases were then used for a trial run computer analysis of pre-1920 non-native men's footwear usage in the Canadian Arctic.

Recording devices for the footwear data

The system for recording footwear usage was developed so that evaluation could proceed using the Statistical Package for the Social Sciences (SPSS) which is available for the analysis of data at University of Alberta, Computing Services. The two criteria upon which the recording scheme is based were that it encompass the type of data that would provide general information on the material, cut, and style of the footwear, and, second, that it include geographic and meteorological data so that discussion could proceed in accordance with the studies of Auliciems, de Freitas and Hare (1973), and Rogers and Sutherland (1971) on cold weather clothing in polar regions. A facsimile of the devised data recording sheets may be found in Appendix 1.

Selected written, illustrative, and artifact resource materials were surveyed. In each instance where information on the footwear being worn was encountered, a footwear identification case number was assigned and then the recording sheet with 94 variables was completed. Categories of variables include the type and location of the archival information, the data and geographical location where the particular footwear was in use, the climatic factors at the time of use, personal characteristics of the wearer and his activities at the time of use, the native peoples with whom he was in immediate contact, the total clothing system being worn, and the material, cut, and style of the particular footwear. Field definitions of the variables used in the data base, and comments when considered necessary, are to be found in Appendix 2.

In addition to the data recording sheets that were developed to relate footwear design with temporal-geographic factors, climatic data, personal data regarding the wearer and the expedition, and the other garments worn in the total clothing assembly, a footwear analysis work sheet was developed to facilitate the physical examination of surviving footwear artifacts. This work sheet was used only in instances where time and facilities permitted laboratory analysis of these artifacts. A facsimile of the footwear analysis work sheet is included in Appendix 3.

Consistent recording of data on the footwear analysis sheet, as well as on the footwear detail section of the data recording sheets, demanded development of a working glossary and a standardized means of classification of textiles and leathers. The researcher has compiled a glossary of terms for use in the description and discussion of footwear used in the Canadian Arctic; it is contained in Appendix 4.

Joseph (1977) was of particular use in development of a working terminology for textile fibers, yarns, and fabrics. The organization of data on textile structures and the final arbiter in classifying yarn, fabric, and accessory stitches on the analysis work sheets was the scheme developed by Emery (1966). Her illustrated key to textile classification of the 1) components used in fabric structures, that is, the direction of twist, the degree of twist, and the angle of twist in the creation of yarns, and 2) the structure of the fabric (e.g. felt, knit, weave), was used extensively in the analysis of the textile components of the footwear.

A publication by the British Leather Manufacturers' Research Association (n.d.), a publication by Reed (1972), and one by Ryder (1973) were used to develop consistent terminology for observations made on hides, skins, and leather.

Terminology on European-styled footwear components and construction was based largely on glossaries compiled by Thornton (1976) and Cohn (1969). Classification of non-native footwear reflects the work of Hald (1972). However, terminology and classification for North American native-made footwear components and construction are based upon Hatt (1969; 1976). Hatt's scheme for classifying moccasins was particularly important for the study of footwear used in the western Arctic and, for this reason, it is summarized in Appendix 5.

The study of ornamentation techniques used in the manufacture of native-made footwear and the development of the working terminology for purposes of description, are in accordance with works by Turner (n.d.), who discusses moose hair tufting and hair embroidery, and Orchard (1929), who classifies quill work and bead work. A number of books on embroidery were consulted, but it was Enthoven (1964) that proved of greatest value in understanding the methods of decorating with accessory stitches. Nonetheless, classification of these embroidery stitches on the analysis work sheets followed the scheme presented by Emery (1966), whether the stitching was done on fabric or leather.

In addition to description of construction and ornamentation, it was necessary to establish the materials from which the footwear was manufactured.

The laboratory analysis of historic arctic footwear artifacts also required consistent terminology for the materials most commonly encountered. As the work sheets organize identification of materials based upon whether it originates from an animal, vegetable, or mineral source, the glossary includes materials of animal origin, that is, depilated hides (leather and rawhide), skins with external fibers attached (fur), internal fibers (sinew and gut), and secreted filaments (silk). It also includes materials of plant origin, that is, fibers from plant seeds or fruits (e.g. cotton), from leaf fibers (e.g. sisal), and from stem fibers (e.g. flax). Other biological materials used in early arctic footwear that were derived from plant materials include cork (Cooke, 1961) and rubber.

A number of microscopic and microchemical tests would be appropriate for the study of mineral materials used in historic footwear. For example, worked metals constitute the material from which boot cleats were manufactured, as well as the metal eyelets which were patented in 1823 (Swann, 1975, preface). The only test which was conducted by the researcher, however, was the use of a magnet to test for attraction. For this reason, terminology relevant to the study of metal was not included in the working glossary.

Man-made or synthetic materials were not common during the years under consideration and, thus, also are ignored in the terminology.

A number of standard microscopic and microchemical techniques were used to identify the textile materials found in the footwear artifacts. The routines are discussed in Joseph (1977) and need not be enumerated here. On each work sheet the tests that were conducted on particular artifacts are recorded and, thus, could be replicated when deemed necessary.

Coding of data for the SPSS program

For each variable specified values were assigned. Missing values were assigned when the documentary source did not contain the necessary information. It then was possible to determine the value of specific sources of information as well as to document the material, cut, and style of the footwear being utilized under particular conditions.

The observations recorded for each footwear case variable were then noted by means of an assigned numeric value. These values, in most cases, served only as labels for predetermined categories since the majority of recorded measurements were at the nominal level of measurement. Examples of nominal level measurements are "footwear title" (e.g. boot, shoe, sandal, overshoe) or "sponsoring organization," (e.g. British Admiralty, Hudson's Bay Company, National Geographic Society). In some cases measurement of the variables may be of an ordinal level, for instance, "activity level" (scaled 1 to 5), or "cloud cover" (scaled 1 to 3). In a few instances measurement is at the interval level or ratio level such as for the variables "temperature" and "wind velocity." Space left on the data recording sheets allowed additional notes and sketches to be made for any footwear case variable if added clarification was necessary.

Because the data are primarily nominal, the statistics that can be produced using computer analysis most often are descriptive statistics and one-way frequency distributions when considering single variables. Contingency tables may be created by using cross tabulation analysis when associations between two or more variables are desired. Measure of association between variables is then determined by using the chi-square test of statistical significance. While statistical analysis of footwear data is not considered to be a major portion of the study, the pilot study indicated that it could serve as one tool in the documentation and analysis of historic cold weather clothing practices.

Evaluation of data collection: the pilot study

At each institution that was visited in the pilot study the curator or librarian was consulted regarding the best use of the time available; this was done on the assumption that the person in charge was most familiar with that institution's particular collection and that this person could best recommend important documentary materials for study. As a consequence, footwear cases were obtained from those materials that were chosen by the curator in charge of each arctic collection.

At Central Museum, the Peary-MacMillan Arctic Museum, and the Kendall Whaling Museum, all materials considered relevant by the curator were examined. At the National Maritime Museum, the Old Dartmouth Historical Society Whaling Museum, and the Maritime Museum at Searsport, curators directed attention only to public exhibits. More time could have been usefully spent at Dartmouth and the Scott Polar Research Institute; in fact, the collections at the Scott Polar Research Institute are so vast that only a small sampling of the recommended documentary sources could be viewed in the time allotted at that institution.

The data collected on non-native pre-1920 arctic footwear for the pilot study were all collected prior to September, 1980. The data were recorded on the developed data recording sheets and then entered onto disk in a computer data file. The data for the pilot study included cases from all three types of documentary materials, i.e. written, visual and artifact.

Upon consideration of the pilot study results, that is, both conversations with curators at the various important collections, and the coding of footwear cases for computer analysis, it was clear that actual artifacts yield the most information on material, cut, and style of footwear. The categories of climatic factors, personal characteristics of the wearer, activities, and total clothing system, however, appeared not well served by either visual or artifact sources. Visual data, in addition, presented many problems in terms of missing information and remodification of artwork by subsequent artists. This problem of remodification of drawings and engravings makes detail, even when highly visible, very suspect; the result is that details are often unreliable when using many illustrative sources. Formal photographs of explorers offered little information on arctic clothing and footwear usage, although informal photographs of men at work were of use. These, however, were only available for study of several American and Canadian exploration parties. The most complete data were recovered from diaries and personal narratives, although it must be recognized that the reason that this was true is because material in the total document becomes available for data collection. This, then, presents some difficulties in accurately comparing the usefulness of the three types of documentary sources. Nonetheless, work done during the pilot study suggested that written materials should be the prime source in gathering data for the analyses of changes in footwear over time and acceptance or rejection of native forms of footgear.

Because travel to various repositories of arctic documents made it possible to evaluate the types of materials available for study of historic non-native arctic clothing, it became clear that concentration on written sources could best provide data on clothing usage; however, it would be necessary to analyze footwear artifacts to establish material, cut, and style of historic cold weather footwear. While visual evidence would continue to be recorded when available, as would evidence from any artifact sources that might be located, concentration in the main study was to focus on written journals, diaries, reports, and published narratives.

The main study

In conducting the pilot study it became evident that no random method for surveying written, visual, and artifact resources for the study of historic cold weather clothing could be developed in the time allotted for the study. Being a preliminary investigation on a subject in which little research appears to have been previously initiated, location of sources for analysis was as demanding as the study of the resources once they had been located. Of the institutions visited certainly the Scott Polar Institute had the most complete indexing of historic documentary sources, yet, it would be a study in itself to pinpoint the number and location of all useful study materials that might compose a population for sampling. Therefore, an arbitrary number of non-randomly chosen cases was decided upon as constituting the requirements for the main study. Emphasizing written narratives housed at the Boreal

Institute of Northern Studies, University of Alberta, 375 additional footwear cases were located and pertinent data recorded on the data recording sheets. Care was taken to see that publications from each decade from 1820 to 1920 were surveyed to ascertain the types of footwear common in that period of time. Cooke and Holland (1978) served as a guide to the written literature that was chosen for study.

Thus, in total, 500 footwear cases were compiled non-randomly from all three types of documentary sources, using cases obtained in both the pilot study and the main study. In obtaining these cases first person narratives were emphasized. However, as previously mentioned, to learn specific detail on footwear materials and design it was clearly necessary to conduct detailed analysis of artifacts.

A number of collections of historic arctic footwear were located but time and travel constraints only permitted study of examples housed in Alberta. Thus, the number of artifacts available for study was only a small portion of those that have been collected from historical arctic sites. Analyses were conducted on the footwear artifacts collected from the McClintock Cart Site by Dempsey (Calgary, n.d., unpublished report) on Melville Island in 1968 and the leather artifacts, which appear to be remnants of footwear, collected by Hickey (see Hickey, 1979, for a report published prior to the discovery of these artifacts) in 1980. Both collections are of British footwear utilized in the western Canadian Arctic prior to 1855 by British Arctic Expedition personnel. Laboratory work was conducted in the Conservation Laboratory, Glenbow-Alberta Institute, and in the Department of Anthropology, University of Alberta.

While no native-made footwear artifacts that were worn by explorers prior to 1920 in the Arctic have been located in collections housed in Alberta, laboratory analysis on pre-1920 native-made and native-worn footwear has been conducted to determine the material, cut, and style commonly used in manufacture. This has been important to understanding the footwear used in the North by non-native men since a number of explorers hired native women to construct footwear for expedition personnel or purchased native-made footwear at trading posts and in native settlements.

A problem inherent to archeology and the study of historical clothing is that articles used on a daily basis do not survive for later study to the same extent that seldom used articles are preserved. Early in the course of data collection there was evidence to suggest that native-made footwear was acquired when possible and often utilized until it was no longer recognizable. European-styled footwear, meanwhile, was put aside or cached if the explorer had access to native-made footwear. Consequently, European boots and shoes have been left intact for study while Indian and Inuit footwear actually worn by Europeans has not survived. To not study the material, cut, and style of native footwear would be to place greater stress on the less functional cold weather footwear and to ignore that which provided more satisfactory service. For this reason, documentation of Athapaskan-made footwear housed in the Provincial Museum of Alberta, Edmonton, has been included in this study.

Footwear analysis worksheets documenting the artifacts that have been studied are housed with the accession records kept at each of the respective institutions. Data recorded for the 500 footwear cases are listed in Appendix 6. The footwear artifacts used by British Arctic Expedition personnel are included in the 375 footwear cases that constitute the "main study" of the documentation and analysis of footwear. However, none of the Athapaskan artifacts are included in the computerized analysis since they were not known to be worn by non-natives, even though archival records can be used to demonstrate that 20th century design is very similar to the design of native-made footwear worn by the early Arctic explorers.

A summary of the sequence of the study

The study was initiated in March, 1980, with the researcher being awarded a grant-in-aid (for travel, film and xeroxing, and necessary computer time) by the Boreal Institute of Northern Studies.

In July, of that year, seven days were spent at the Scott Polar Research Institute in Cambridge, England, three days at Central Museum in Northampton, and one day visiting the public galleries at the National Maritime Museum in Greenwich. After return from England, two weeks were spent in the United States. A day was spent at the Kendall Whaling Museum, two days at the Peary-MacMillan Arctic Museum, and four days visiting the public displays in various other museums in Massachusetts and Maine. Three days were spent studying archival materials at Dartmouth College in New Hampshire. In October, 1980, the data recording sheets were developed and 125 footwear cases were coded and processed from materials gathered during the summer. The main study was then begun.

In December, 1980, one day was spent looking at the footwear collection at the Bata Shoe Museum in Don Mills, Ontario, and eight days were spent studying archival materials in the Public Archives of Canada in Ottawa. In May, 1981, three days were spent at the Nova Scotia archives and four days were spent at the Newfoundland archives. In August, four days were spent in Calgary at the Glenbow-Alberta Institute and in the library of the University of Calgary surveying the publications that were gathered by the Arctic Institute of North America. Two additional days were spent at the Glenbow-Alberta Institute in February, 1982.

All other work for the study was done in Edmonton. Reading at the library of the Boreal Institute of Northern Studies and coding of footwear cases were done intermittently with the travel outlined above.

From February through April, 1982, study concentrated on the analysis of footwear artifacts. The footwear analysis work sheets and the working glossary of terminology useful to the study of historic Canadian Arctic footwear were devised. Detailed analysis of the artifacts from Banks Island and Melville Island was initiated. All of May was spent documenting and analyzing the Athapaskan footwear in the collections of the Provincial Museum of Alberta.

IV. Findings

The presentation of the results of this study is divided into three sections. The first section discusses the status of the historic cold weather clothing bibliography.

The second section surveys the clothing that was used prior to 1920 in the Canadian Arctic. This is presented using examples from documentary communications that are typical of clothing choice and of the problems that arose in securing this clothing by the British, the Americans, and the Canadians. Following this description of already manufactured clothing and the materials available for clothing manufacture is a listing of the footwear cases from which data have been extracted for inclusion in the computerized study. So that future researchers may more easily pursue a study of historic footwear, the footwear case number, the designated name of the footwear, and the written or unpublished source from which it was extracted are listed.

The third section presents problems and results of the footwear analysis portion of the study. Because information was recorded on the material, cut, and style of the footwear that was actually worn, as well as associated information on the number of layers worn in the clothing assembly, the climatic and temporal-geographical context of usage, and details on certain aspects of the expedition, the data could be statistically manipulated in a great number of ways. Although many questions could be pursued, the purpose of this study was to compare the usefulness of the three types of documentary materials for determining innovation and cultural borrowing by Europeans in their attempt to obtain suitable footwear for usage in a very harsh environment.

A. Cold weather clothing bibliography

A bibliography of published and other written sources pertinent to the study of historic cold weather clothing has been compiled. It tends to emphasize published articles that mention the material, cut, and styling of historic cold weather clothing, that is, leather and fiber identifications, yarn structure, fabric structure, types of stitching, and the cut of the garment.

The first entries were placed in a SPIRES sub-file for mechanized retrieval. These and subsequent entries are now stored on floppy disk for retrieval on the Apple II micro-computer, utilizing the Visidex program by Personal Software, Inc. The use of the micro-computer system has the advantage of portability, making it possible to utilize the stored information in research situations located outside of Alberta.

B. Documentation of clothing practices

South of the Arctic Circle, sites on Newfoundland have yielded textile tools and clothing artifacts that indicate the presence of Europeans in North America as early as the 11th century. The earliest clothing artifacts representing non-natives' usage in the Canadian Arctic come from archaeological sites on Ellesmere Island that represent 13th century Norse settlements.

English expeditions in the North were conducted by Frobisher, Cabot, and others. The writings of these men provide some hints as to the ways they sought to dress for cold weather conditions in the 15th, 16th, and 17th centuries. However, the writings of these explorers provide more information on English clothing attitudes as they discuss native clothing practices.

The inaccessibility of unpublished documentary materials and surviving clothing artifacts relevant to these early expeditions made it impossible to gather sufficient examples of clothing usage and footwear design to justify inclusion in the computerized study. Thus, the collection of footwear data on the developed recording sheets begins with the year 1820. Therefore, examples of clothing usage in this section are first presented by century. Then, in accordance with the objectives of the study, the focus is placed upon English speaking expeditions that represent different modes of travel in different areas north of the Canadian Arctic Circle. Examples of clothing stated to be in use, and the availability of textile products that might be utilized in the construction of clothing, are presented decade by decade until the cut off date of 1920.

Textile evidence: Pre-1400

Present knowledge of northern expedition history indicates that Norse were the first Europeans to visit arctic North America. The saga of Eric the Red, the Karlsefni Saga, and the Short Saga suggest that Eirik Thorvaldsson spent the summer of 982 A.D. exploring either Cumberland Sound or western Greenland (Mowat, 1966, pp. 58-66; Cooke and Holland, 1978, pp. 13-15).

It is known that the Norse colonized Greenland before the year 1000 A.D. and house sites and artifacts located at the L'Anse aux Meadows site, at the northern end of Newfoundland indicate Norse habitation here, as well. The presence of a fragmentary bone needle and a soapstone spindle whorl, as well as possible stone loom weights (Ingstad, 1977, pp. 192, 261) suggest textile production and sewing activity. No textile or leather artifacts were located, though the fact that a Norse type spindle whorl was found strongly suggests that yarns and fabrics were being produced.

In the Arctic, the area under consideration, Schledermann (1981) has located sites in the area of Bache Peninsula on Ellesmere Island which are most certainly Norse in origin. A medieval chain mail armour was located in 1978 on Skraeling Island. Also, a piece of woollen cloth, dated 1250 A.D. by radio carbon dating, and analysed by Ostergaard of the National Museum at Brede, Denmark, has been demonstrated to be of typically Norse construction. The fabric is woven as a 2/2 twill, with one thread being Z-spun and the other S-spun; the thread count is 9 x 6 per cm. These characteristics are similar to Norse fragments from sites in western Greenland (Schledermann, 1980, p. 459) that are made of sheep's wool. For this reason, one can assume that garments made of sheep's wool were utilized before 1400 in the North, both in Newfoundland and on Ellesmere Island.

One may also assume that footwear used by the Norse prior to the 14th century was of the type typically worn by the Norse in that century. Medieval Viking footwear has been described by Foote and Wilson (1970, pp. 174-175) as of two kinds. The uppers of one style consisted of two pieces of leather, with slits along the upper edge for lacing. The uppers are sewn together at the back or side, resulting in a pointed heel and a slashed ankle piece. A second style of shoe has a rounded heel and lace holes made with two to four slits. Calf skin or goat skin was often the material from which medieval Norse footwear was constructed. Until footwear artifacts are located from the North American pre-14th century sites, however, one can only speculate on how the Norse constructed footwear for use in the Canadian Arctic.

Clothing documentation: 1400-1600

Little information was located regarding the cold weather clothing assemblies worn by explorers to the Canadian North between the years 1400 and 1600. However, there is evidence that these expeditions brought back knowledge about the way that North American natives would dress for the cold. For example, John and Sebastian Cabot, Italian explorers in the service of England, conducted a British Northwest Passage expedition in the years 1497 and 1498. They visited Maine, Nova Scotia, Newfoundland, and probably, Labrador, these being the first recorded visits to North America by the British. It appears they they were equipped for trading with the natives for Biddle (1832, p. 241) writes that "it is known from Lord Bacon ... and the early annalists, that the vessels which sailed with Cabot were fraught with gross and slight wares for commerce with barbarous people."

In a passage taken from Stow's Annals in the year 1502 (Biddle, 1832, p. 229) it is stated that natives were taken back to England in the 16th century.

> This year were brought unto the King three men taken in the Newfound Ilandes by Sebastian Cabato before named in anno 1498; these men were clothed in beast skins and did eate raw flesh, but spoke such a language as no man could understand them, of the three men two of them were seen in the King's Court at Westminster two years after clothed like Englishmen and could not be discerned from Englishmen.

At the same time that North American natives were being exhibited in England, a letter written in 1501

(Biddle, 1832, pp. 239-240) describes the natives that Corte-Real had brought back to Europe.

> They ... bear the greatest resemblance to Gypsies; are clothed with the skin of different animals but principally the otter; in summer the hairy side is worn outwards, but in winter the reverse; and these skins are not anyway sewed together or fashioned to the body, but just as they come from the animal are wrapped about the shoulders and arms; over the part which modesty directs to be concealed is a covering made of the great sinews of fish.

Corte-Real, a Portuguese navigator sailing for King Emmanuel in 1500, sighted Greenland or Newfoundland and, in 1501, his party had captured 50 Eskimos after landing on what was probably the Labrador coast. One can suppose that this type of information on native peoples and their way of dress, whether fact or fanciful, quickly spread throughout Europe.

The northeast coast of Canada was also explored by the English navigator, Sir Martin Frobisher, who sought the Northwest Passage and mining sites. During his three voyages, which occurred in the years 1576, 1577, and 1578, Frobisher and his men met native peoples, provided trinkets for them, and gave at least some European clothing items to them. Frobisher related how his men traded looking glasses, and other toys, for coats of seal and bearskin (Frobisher, 1938, p. 49) during his first expedition. Methods of trade used by the natives suggested to expedition members that Baffin Island Eskimos were already familiar with trading to Europeans who came in ships (Stefansson, 1938, pp. cv-cx).

A list of expenses and equipment used for Frobisher's second voyage indicates that wool cloth was taken to make jerkins, breeches, and hose; canvas and linen cloth was taken for doublets, shirts, hats, caps, and shoes (Frobisher, 1938, Vol. 2, p. 98). No information was presented to indicate how garments made for northern conditions differed in design from typical late 16th century English clothing.

Further south from the area visited by Frobisher, Spanish Basques were actively involved in whaling in the 16th century. Documents discovered by Barkham (1978) made it possible for archaeologists to locate a Basque whaling station near Red Bay, Labrador, that had been occupied around 1540 A.D. Excavations by Tuck, Bennet, and Grenier (Tuck and Grenier, 1981) have located well preserved shoes and other clothing artifacts from the rich site (M. Segal, personal communication). These artifacts have yet to be analyzed in detail and specific information on design is presently unavailable.

Known European expeditions to the Canadian Arctic are limited to the eastern portion of the continent. The sparse information available on clothing usage by nonnatives indicates that most clothing was brought from

Europe, but that some clothing was obtained by trade with native peoples.

No detailed data were located on footwear design; however, since expeditions were ship-based and little overland traveling was done, one can speculate that shoes and leather boots, in vogue in Europe at this time, were utilized. If Wilson (1969, p. 102) is correct that British shoes in the early 16th entury were cut very wide and, subsequently, stuffed with a packing of moss or hair, the design of the footwear at this time was well suited for cold weather conditions.

Clothing documentation: 1600-1820

In the 17th century various expeditions to the North were sponsored by private companies (Cooke and Holland, 1978, pp. 26-46). The East India Company sponsored Weymouth and Drew, who reached Frobisher Bay. The Northwest Company sponsored Henry Hudson, explorer of Hudson Strait and James Bay, and Bylot and Baffin, who reached Resolution Island, Baffin Island, Foxe Channel, Southampton Island, and Smith Sound. Foxe was sponsored by various London merchants. Personnel on these expeditions likely conducted some trade with the native people, as well as bringing information on native clothing styles back to England.

In 1670 the Hudson's Bay Company was established. It was expected that they would conduct much northern exploration. Initially, very few expeditions occurred.

In 1715-1716 William Stuart travelled with a Chipewyan woman and 150 Crees, across land from York Factory to an area south of Great Slave Lake. In 1770 Samuel Hearne travelled with a group of Indian companions from Churchill to Coppermine River in order to reach new populations for potential trade.

A second important company, the Northwest Company, was also significant in bringing trade items into various localities in the North. With the organization of this company by a number of traders from Montreal and London (Cooke and Holland, 1978, p. 99), the Hudson's Bay Company faced competition in the Canadian sub-Arctic. Peter Pond and Alexander Mackenzie represented the Northwest Company in the western Canadian North.

While these two trading companies sponsored many of the overland expeditions, the British Admiralty sponsored ship-based expeditions in the western Arctic at this time. James Cook, while attempting to find the Northwest Passage, investigated Norton Sound, stopping at Unalaska, then spending three weeks in Hawaii. The western Canadian arctic coast remained, for the most part, a mystery to the Europeans until later in the 19th century.

The Americans, to a lesser extent, were active in the North in the 18th century. For example, in 1729, 1753, and 1758 Henry Atkins sailed from Boston, on whaling and trading expeditions. Trading was done with the natives in Labrador and probably on the coast of Newfoundland

(Cooke and Holland, 1978, pp. 57, 70, 75). In 1753, Benjamin Franklin and others sponsored a Northwest Passage expedition, led by Charles Swaine, which went to the mouth of Hudson Strait, then turning back to explore the Labrador coast. One stated purpose of the trip was to "cultivate a Friendship with the Natives" (Solis-Cohen, 1943, p. 25). The expedition took 15 people, including persons knowledgeable of various Indian languages and skillful at fishing. After returning from the second voyage, Captain Swaine gave the Library Company of Philadelphia several costumes worn by "Eskemaux Indians" from southern Labrador.

Published reports from this time period give accounts of the native clothing that was observed to be in use. However, very little detail on the material, cut, and style of the clothing worn by the non-native explorers is recorded. Mackenzie (1966, pp. xciii-xcv) notes that in the late 18th century the Indians wore fur and skin clothing or European woollens and that European articles of adornment were preferred to more traditional native pieces. Already, by the mid-18th century, fur trade activity in the Canadian sub-Arctic had brought European textile goods to interior locations in the North. For example, trade goods sent to Cumberland House in 1777 (Nicks, 1982, p. 12) included red, blue, and white broad cloth, red and blue duffle, flannel, worsted lace, thread, twine, shirts, stockings, and blankets, plus textile tools such as scissors and needles. Ray (1978) outlines the areas which were supplied by goods from the Hudson's Bay Company in the 18th century.

This availability of European goods is reflected in both native and non-native clothing attire. The use by native peoples of blankets, woollen fabrics, beads for decoration, and the use of European textile tools for clothing manufacture, is commonly mentioned in published narratives from this time period. One assumes that expedition leaders such as Hearne and Mackenzie wore much native-made clothing and wore exclusively native-made footwear when travelling with native companions; yet they make virtually no mention of their attire. This very factor may be evidence that the explorers were wearing primarily native-made clothing, since study of published narratives from later decades suggests that the British hesitated to record their personal use of native-made clothing.

No detailed information on the material, cut, and style of footwear worn in the Canadian Arctic during the 17th and 18th century was located.

Clothing documentation: 1820-1830

The earliest exploring party from which data have been derived for inclusion in the computerized study is John Franklin's group that left York Factory, going by way of Cumberland House, Carlton House, Fort Chipewyan and then to the northern arctic coast. Although the provisions, instruments and other articles needed for the journey had been brought over to York Factory on board a

Hudson's Bay Company ship (Franklin, 1969, p. xviii), it appears that clothing and snowshoes were to be obtained when needed from Hudson's Bay posts and from the Northwest Company. Franklin writes (1969, p. 53), for example,

> I had previously written to the partners of the North West Company in the quarter, (Athabasca), requesting their assistance in forwarding the Expedition, and stating what we should require of them.

Speaking of both companies (Franklin, 1969, p. 165), he writes:

> All of the stores were demanded that could be spared from both the establishments, and we rejoiced to find ... that we had a sufficient quantity of clothing for the equipment of the men who had been engaged here, as well as to furnish a present to the Indians.

Dress for the winter traveller is described by Robert Hood, the Midshipman with Franklin (Franklin, 1969, pp. 94-95):

> The general dress of the winter traveller is a capot, having a hood to put up under the fur cap in windy weather, or in the woods, to keep the snow from his neck, leathern trowsers and Indian stockings, which are closed at the ankles, round the upper part of his moccasins, or Indian shoes, to prevent the snow from getting into them. Over these he wears a blanket, or leathern coat, which is secured by a belt round his waist, to which his fire-bag, knife, and hatchet are suspended.

More detail on dressing for the cold when walking is provided by Hood (1974, p. 74):

> It was easy by exercise to keep the body warm in the open air. No additional clothing is required except flannels, and the feet are wrapped in several folds of duffil. The shoes [moccasins] worn by both natives and Europeans are made of

> moose skin, and tied with thongs above the ankles. Mittens are suspended by a cord round the neck, for the hands. Many expedients have been tried to protect the face, of which a mask is the best. The breath freezes and forms a coat of ice on the inside, to which every respiration adds a fresh surface, but it is a defense against the cold.

Drawings by Lt. George Back (Franklin, 1829, pp. 114, 189, 225) substantiate the use of hoodless knee-length coats, European-style hats, and ankle-length pants that are tight at the ankles, but are not tucked into the footwear. Footwear in the drawing is indistinct but one can assume it illustrates the Indian-style moccasins, made by Indian seamstresses whenever they were obtainable, since Franklin's narrative implies that his group was totally dependent on being supplied by the Indians and had made no provision for providing for themselves.

Hudson's Bay Company employers and native community leaders had promoted instances of intermarriage between Indian women and European men to cement business connections beneficial to both parties (Nicks, 1982, pp. 10-22). The arrangement was encouraged because, as one trader explained:

> They clean and put into a state of preservation all Beaver and Otter skins brought by the Indians undried and in bad condition. They prepare Line for Snow shoes and knit them also without which your Honors servants could not give efficient opposition to the Canadian traders they make Leather shoes for the men who are obliged to travel about in search of Indians and furs and are useful in a variety of other instances. (Nicks, 1982, p. 17)

Nonetheless, the men were able to manufacture some of the clothing for their needs if materials could be made available. For example, on July 21, 1821, when the party came upon an island where the Inuit had a store of supplies, Franklin states that they took "seal-skins to repair our shoes, and left in exchange a copper-kettle, and some awls and beads," or, after supplies had arrived from Fort Providence, "We now set about making mittens and snow-shoes..." (p. 481).

By contrast to Franklin's land expedition, the Parry expedition, travelling on the ships Hecla and Griper, and looking for the Northwest Passage, appears to be amply supplied. In a letter written May 11th, 1819 (Anonymous, 1821) it is stated that "...nothing in fact has been refused by the Lords of the Admiralty which was supposed, or suggested to be useful...." Among the provisions taken were articles specifically for bartering with the natives; among these articles were "jackets and trowsers of coarse cloth" (Fisher, 1821, p. xi).

It has not been established whether officers received all the clothing necessary to meet their needs from government issue. Clearly, the crew members did not. The letter, written in 1819 (Anonymous, 1821), goes on to state that the seamen and marines received their pay that "they may provide various articles of clothing and necessaries for the voyage, agreeable to a list furnished by officers on board." The surgeon on this expedition, Alexander Fisher (1821, pp. xi, 5), reiterates this same idea, that is, that each man "was furnished by Government with a suit of warm clothes, and a wolf-skin blanket, gratis."

It may be assumed that it was standard policy for naval crews to be obliged to pay for their own clothing supplies, for as Lyon (1971, p. 2) notes in 1824, the ship's company only received their pay when they provided themselves with the types of warm clothing that he insisted on their purchasing. However, it was policy for the government to supply to each officer and man one suit of clothing (Lyon, 1971, pp. 2, 12). Lyon says, "I now issued an entire suit of warm clothing (a gratuity from the Government) to each officer and man." It is not clear, however, if the clothing held for each man was always a gift. Belcher (1852, p. 105) writes:

> an old principle, established in well regulated ships about the year 1821, of allowing a certain number of contractors to fit the men, muster them before pay-day, and deposit their ticketed clothes until the First Lieutenant saw they were paid for, and the duplicate taken for later distribution.

The design of clothing being utilized can be ascertained from drawings by Captain Lyon while on the Parry expedition. In a drawing titled the "Fall of the Barrow" (Parry, 1824, p. 266) three styles of dress are clearly portrayed. The differences can be attributed to sociopsychological factors rather than physiological requirements for one can assume that an officer, mate, and crew member are represented. Because it is known that many members of the naval crews were taken, not always of their free will, from the Orkney Islands and the Hebrides, one assumes dress differences might reflect regional differences in origin, as well as social class. Pants of crew members are ankle-length and not tucked into the footgear. Most of the clothing is of cloth rather than fur, even though it is said to be February. The jackets are hoodless, though the collar or caped coat worn by the officer may be of fur and the mate's fabric coat appears to have a fur collar. Top hats are worn routinely by the officers but crew members are more often portrayed as bare headed.

In each case close fitting boots or shoes are drawn. Frost bite was a continual problem (Fisher, 1821, pp. 124, 158), but a letter written March 1, 1820, from Winter Harbour, at the 75th parallel, shows that recognition of a method for the prevention of frost bite had occurred.

> In the end of last year and the beginning of this, a number of our people were what is called frost nipped; frost-bitten is a rather alarming idea. These accidents generally happened when they were taking brisk exercise in walking or running on shore; the very time, one should have imagined, when they were the least exposed to them; and the very means which one should have adopted to prevent such accidents. The case, however, was at last discovered to be the harshness of the boots worn by the men, which interrupted the circulation of the blood; and when in their place easy boots, made of canvas, and lined with flannel, or other woolen stuff, with soles of raw hide, were used, it is almost incredible how few frost-bites occurred. (Anonymous, 1821, p. 67)

The variety of designs for easy boots has not been determined; here follows an indication of one style:

> A pair of snow boots were now (October 18, 1821) issued gratis to each individual in the Expedition, being part of a stock of extra warm clothing liberally furnished by Government, to be supplied to the officers and men, at my discretion, as occasion should require. These boots were made of strong drab cloth with thick soles of cork, the slowly conducting property of which substance, together with their large size, afforded the utmost comfort that could be desired. Boots or shoes of leather never retain the warmth long, under circumstances of very severe exposure. (Parry, 1824, p. 128)

Belcher (1852, p. 104) seems to imply that boots, at the time of Parry's expedition, are a matter of general supply on Admiralty sponsored expeditions.

Clothing used in this decade includes cork and drab cloth shoes, stockings, flannel shirts, sleeping caps, Flushing jackets, a blanket with drawstrings to form a bag, and a wolf skin blanket. Various fabrics have been found to have been in supply. These include: waterproof canvas, no. 7 brown double canvas from Charles Macintosh of London, French grey cloth (lined), brown sheeting (lined), French grey cambric (double), sheepskins lined with cloth, scarlet kenseymore lined with blue cambric, and brown canvas lined with brown linen. No detail on these fabrics has been established by the researcher, nor is it known exactly what clothing was made from these fabrics. In at least one instance red cloth and a red shirt were traded to the natives (Fisher, 1821, p. 276). It is not known if this was "strouding," a fabric made in England specifically for trade to North American natives.

Wallace (1980, p. 11) has found that by 1824-25, when Parry made his third voyage, clothing for Arctic conditions had evolved from standard pattern naval uniforms to long fur-lined "pea jackets" of closely woven blue box cloth and that waterproof material was being tried.

Trade or outright purchase for clothing needs was extremely important to the land expeditions. To expeditions travelling by ship, however, it was expected that all the clothing provisions needed were already on shipboard. Nonetheless, trade was highly established by this time. Lyon (1971, p. 38) mentions trading for everyday clothing needs. Ross, whose voyage lasted from 1829 through 1833, and his party furnished themselves with necessary boots and gloves through trade, while anchored in Holsteinburg, Greenland. This will be discussed in the next section.

Footwear cases: 1820-1830

Footwear utilized prior to 1830 has been studied using written and visual sources. The name of the footwear is that which the author himself used. The written sources that provided footwear data cases are:

case 108	native boots, Ross, 1969, p. 70
case 207	snow boots, Franklin, 1969
case 235	Indian stockings, Franklin, 1969, pp. 94-95
case 236	shoe, Franklin, 1969, p. 363
case 237	socks, Franklin, 1969, p. 398

The early visual communications and drawings of arctic explorations were most often made on location and then sent back to England for engraving by a person who did not have personal experiences in the North. As a consequence, the visual documentary sources tend to give representations of the total clothing assemblies but generally the footwear was not drawn in detail. For these cases the footwear title can not be designated:

case 7 Franklin, Vol. I, 1829, p. 189
case 8 Franklin, Vol. I, 1829, p. 225
case 9 Franklin, Vol. III, 1829, p. 114
case 10 Parry, 1824, frontspiece
case 11 Parry, 1824, p. 266
case 12 Parry, 1824, p. 351
case 51 Bradford, New Bedford
case 52 Brewington, p. 150
case 53 Bradford, New Bedford

In four instances it was felt that footwear titles could be designated for pre-1830 visual data. These are:

case 3 boots, Anonymous, 1821, p. 92
case 40 boots, Ross, 1835, p. 664
case 107 boots, Franklin, 1969, pp. 432, 481
case 112 moccasin-boots, Anonymous, 1821, p. 92

No surviving artifacts were located that pre-date 1830.

Clothing documentation: 1830-1840

From 1829 to 1833 John Ross and James Clark Ross searched for the Northwest Passage on a private venture sponsored by Felix Booth. Their expedition had been expedited for two years; it lasted for four years due to heavy ice. In August of the fourth year they were rescued by whalers. During the four years that they headquartered in Felix Harbour, Boothia Peninsula, many overland expeditions were carried out. Dress then had to serve land as well as shipboard conditions.

The John Ross party conducted much trade with the native peoples to obtain clothing suitable for arctic conditions. In the Holsteinburg area of Greenland, the men furnished themselves with boots and gloves in exchange for cotton handkerchiefs and old clothes (Ross, 1969, p. 70). While in the ship's headquarters, contact between the British party and the Inuit remained frequent and trade for clothing was of importance. Each party received goods and Ross was quite cognizant of the mutual dependence of his men and the Inuit in the trade relationships (Ross, 1969, p. 487). Inuit dresses, sealskin jackets, boots, gloves, and animal skins were obtained in trade (Ross, 1969, pp. 275, 279, 286-87, 320, 577). During times that the Inuit did not remain near the ship, the men were lacking in new clothing supplies. Ross states (March 31, 1831):

> Our disappointment in not seeing the Esquimaux continued daily increasing, as their expected arrival was the longer delayed.... We were also in want of seal's flesh for our dogs ... nor were we so well stocked with skin dresses as not to wish for more. We still looked forward to their visits with hope. (Ross, 1969, p. 509)

Because the goods traded to the natives were as valuable to them as the clothing was to the Ross party, Inuit groups travelled from a distance to obtain European goods such as knives and iron hoops. For example, Ross speaks of meeting five native families whom he had not previously met: "They had heard of us at Neirchille, and came for the purpose of bartering some clothing for our valuable articles" (Ross, 1969, p. 577). To facilitate this exchange of European goods, Ross had made an attempt to encourage natives to come to the ship by setting out direction posts for the natives so that it would be easier for them to locate the ship (p. 487). While Ross stated that "a quantity of flannel cartridges were given to the men for repairing their clothes before encountering the journey upcoming to Batty Bay in July 1831" (p. 707), clearly, trade with the Inuit was of utmost importance in clothing procurement for the men.

All this while, the British Royal Navy attempted to maintain traditional Navy dress standards. "On Sunday, no work was allowed. The men were mustered, and inspected in their best clothes..." (Ross, 1969, p. 214). As their journey had lasted two years longer than intended, however, the quality of their clothing deteriorated so badly that Ross stated that his men could no longer be guessed to be gentlemen since they were "dressed in the rags of wild beasts rather instead of the tatters of civilization" (Ross, 1969, pp. 721-722). Thus, clearly, dressing in the furs of the natives rather than cloth clothing of the British is an embarrassment when the group is located by the rescuing ship. Drawings done on the Ross expedition all show the men in fabric clothing rather than animal skins. Coats are thigh or knee-length, belted, blue in color, with buttons up the front; pants are not tucked into the boots.

Because it had been feared that Ross's expedition had perished, a search for it ensued. During the years 1833 to 1835 George Back led a private venture funded by public subscription to search for the missing Ross expedition. This party went to New York and then to Fort Resolution on Great Slave Lake, to the Back River, the coast, and to Fort Reliance on the eastern end of Great Slave Lake. Indian guides were instrumental in their travels. ?

In this decade, the Hudson's Bay Company continued running supply voyages from London and new trading posts continued to be established. Exploring expeditions sponsored by the Hudson's Bay Company emphasized reconnaissance of the western Canadian Arctic with Dease and Simpson leaving Fort Chipewyan and traveling the Mackenzie River by canoe, and then canoeing the coast to Point Barrow, Alaska. Also, John Bell, in 1839, left Fort Good Hope to investigate the Peel River, the Mackenzie Delta, and the Rat River.

The British Navy sponsored an official expedition, which was led by George Back, to survey the northern coast. British whaling voyages were common to the North. The ship Isabella, the one that picked up Ross and his men, was in Prince Regent Inlet and Lancaster Sound; the whaling voyage led by Simpson and Penny explored Exeter Sound. As in the earlier decades, it appears that ship-based operations had far more clothing provisions available than land-based operations.

Footwear cases: 1830-1840

Ross (1969) provided two written sources for information on footwear used in this decade. These are:

case 238 native boots, p. 294
case 239 native boots, p. 334

Two footwear cases come from the Surgeon's report in Ross's (1835) expedition report. These are:

case 137 night stockings, p. cxxv
case 138 stockings, p. cxxv

As was true with visual documentary sources prior to 1830, drawings that were done have resulted in general clothing detail being visible. The following footwear cases reflect the total clothing assembly:

case 13 Ross, 1835, p. 346
case 14 Ross, 1835, p. 373
case 37 Ross, 1835, p. 350
case 38 Back, 1836, p. 422
case 39 Ross, 1835

No surviving artifacts were viewed that could be dated between 1830 and 1840.

Clothing documentation: 1840-1850

In the 1840s much expansion occurred in the western Arctic. The establishment of more Hudson's Bay Company posts brought more merchandise into the region for sale. During the years 1840 and 1841 John Bell and Alexander Isbister, on a Hudson's Bay Company exploring expedition, left Fort

Good Hope and established Fort McPherson. They became familiar with the area as the Peel River, Rat River, and Arctic Red River area over to the Mackenzie were surveyed and observations made on plants, animals and geology (Cooke and Holland, 1978, p. 177).

Another sort of scientific expedition to be conducted in the west was the magnetic survey of the upper Mackenzie River area led by J.H. Lefroy, who was director of the Toronto Magnetic Observatory from 1841 through 1853. In 1843, with 50 voyageurs and Indians, he and William Henry, of the Royal Artillery, travelled by canoe from the Ottawa River through the Great Lakes to Fort Garry, Cumberland House, Athabasca, Fort Simpson, Fort Good Hope, and back to Edmonton by canoe and snowshoe.

In a letter to his mother, dated March 28, 1844, Lefroy (1955, p. 105) describes the clothing that could be worn:

> I wore a chamois leather shirt and drawers over my others, which were all of flannel, and a coat or capot of blanket, with a hood to draw over the head, and this dress was amply sufficient for comfort. With socks of blanketing and Indian shoes, the feet are rarely cold, unless they get wet, and everyone puts on dry socks and shoes every night.

The best known expedition in this decade, however, was the John Franklin expedition; this party was supported by the British Admiralty. Franklin left England with 129 men and two ships provisioned for three years in the Arctic. By 1847, because no word had been heard from the expedition since July, 1845, when the group had sailed from Greenland, the Admiralty began organizing three relief parties. One of these was headed by Lieutenant W.J.S. Pullen. The Pullen expedition, sponsored by the Admiralty, went by way of Panama, the Horn, and Honolulu where it picked up stores, provisions and water; then it left for the Arctic by way of Kotzebue Sound, Alaska. The ship, the HMS Plover, wintered over on the coast of Siberia. The following summer, after the ship HMS Herald brought more supplies for the Pullen party, they sailed into the western Arctic in search of Franklin.

While not uncommon to go into the Arctic by this western route, it must be noted that this expedition did not stop in Greenland and, thus, did not have access to the trade goods available on the coast of Greenland. Pullen (1979, p. 90), in writing to the Admiralty from Fort Good Hope, says that they are able to proceed on foot

> for which I think we cannot be better provided all hands being equipped with dresses and mocassins of moose leather, than which nothing is better adapted to resist the icy blasts of the frigid north, requiring less under clothing, which should always be of flannel or woollens, except for the feet, duffle or blanket wrappers being preferable to any kind of stocking, and thus the men are less tightly and cumbersomely clad than with the usual provisions of cloth garments, English leather shoes, etc.

Clearly, the group depended on Indian hunters to supply clothing, or at least materials for clothing since Pullen writes the Admiralty asking for clothing to repay their Indian hunters.

Moccasins were purchased by the Pullen party at Fort McPherson but the Hudson's Bay Company posts could not provide the quantity of goods that Pullen had hoped to find (Pullen, 1979, p. 98). He did procure a coat, waist-coat, trousers, shirt and handkerchief for each man but drawers, flannels, and blanket wrappers were unavailable. He thus had to substitute white cloth and blankets (Pullen, 1979, p. 147). Moccasins, however, were the main part of the clothing assembly that were continually in short supply; the moccasins they had brought with them were "of such inferior leather that a day's tracking would wear them out." Subsequently, an Indian woman was employed to travel with them in order to continue making moccasins for the party.

It has not been established to what extent the Franklin party had utilized Indian-made clothing. Captain William Penny reported in The Illustrated London News (September 20, 1851; October 4, 1851) on some of the Franklin clothing remnants he located at Wellington Channel that had been brought to England by Captain Penny.

> A few remnants of clothing brought over denote the situation of the wearer to have been deplorable: they consist of a pair of seaman's trowsers that must have been worn long after the buttons ceased to be of use; they are mended in all possible directions, and evidently patched with what had once been thick flannel, but worn until not a vestige of nap remained, and even in many places worn completely through. A pair of drawers and a few stockings were found much in the same condition; a portion of a shirt, forming the back part of the neck, collar, and back, from the fineness

> of the linen, has most likely belonged to one of the officers. There were also found remnants of an elastic glove, thickly lined with wool, and a few rags. Amongst the heap was a rope-mat, perfectly bleached and left in an unfinished state.

With the loss of Franklin and his men, and the ensuing Arctic searches, more emphasis was placed upon the development of clothing specifically for Arctic expeditions. Hooded fur caps, snow goggles, and the like were designed for inclusion in the provisions taken on shipboard. Clothing for the next decade, the 1850s, then, becomes more suited specifically for Canadian Arctic conditions.

Footwear cases: 1840-1850

Pullen (1979) provided written documentary sources for establishment of footwear usage on ship-based expeditions that did much land reconnaissance as well. These are as follows:

case 118 sea boots, p. 45
case 119 moccasins, p. 45
case 120 moccasins, p. 45
case 121 sea boots, p. 65
case 122 moccasins, p. 65
case 123 moccasins, p. 90
case 124 blanket wrapper, p. 90
case 125 moccasins, p. 93
case 126 blanket wrappers, p. 147
case 127 moccasins, p. 145

Footwear cases representative of an overland journey by canoe and snowshoe come from Lefroy (1955). Both examples come from written description; these are:

case 240 Indian shoes, p. 105
case 241 blanket stockings, p. 105

Two surviving examples of footwear from the 1840s were located. These are the earliest artifacts that were located and assigned case numbers. These are:

case 49 boots, Greenwich, Franklin relic
case 109 sea boots, Greenwich, Arctic relic

In addition, William Penny, as noted previously, located stockings from the lost Franklin expedition. These have been assigned case number 461 (Ottawa, Public Archives, M.G. H 28).

Only a small number of the known footwear artifacts worn during this decade by personnel of the British Arctic Expeditions have been examined by the researcher. Some that are housed at the National Maritime Museum in Greenwich, England, are not dated precisely but may be this early; they have been assigned footwear case numbers. Parks Canada has located a number of footwear artifacts from northern Canadian sites; neither these artifacts nor the accession records have been examined by the author. As the search continues today by archaeologists for more evidence of the fate of the Franklin expedition, it is likely that more footwear artifacts will be located.

Clothing documentation-Canadian: 1850-1860

John Rae made many journeys in the North; in 1850-51, sponsored by the Hudson's Bay Company, Rae, Chief Factor of the Company, spent the winter at Fort Confidence and then set out for the mouth of the Coppermine River with dog sledges and only three men (Cooke and Holland, 1978, pp. 186-87, 208). During the years 1853-54, Rae left from York Factory, reaching Repulse Bay that August where he wintered. In March he continued on to Pelly Bay and resumed surveying the coast until turning back to Repulse Bay and back again to York Factory.

In Rae's report of the journey north from Great Bear Lake he (1852, p. 90) states that "a pair of new moccasins with thick, undressed buffalo-skin soles and stout duffle socks were completely worn out, and before the day's journey was half done every step that I took was marked with blood." Native boots were also used, for on June 10th he says "we were 14 hours on foot, and continuously wading through ice-cold water or wet snow, which was too deep to allow our Esquimaux boots to be of any use" (Rae, 1852, p. 81). These probably had been purchased enroute from the Inuit lodges that they had encountered on May 21 and 22 when "we purchased...some boots, shoes, and seal-skins for our own use" (Rae, 1852, p. 81).

Rae's second trip also depended on his own ingenuity in clothing procurement. He writes, "my small party passed the winter in snow-houses in comparative comfort, the skin of the deer shot affording abundant warm clothing and bedding" (Rae, Ottawa, Family letters, July 29, 1854).

Other land-based expeditions were by James Anderson and James Green Steward, sponsored by the Hudson's Bay Company, who left Fort Resolution in 1855 to look for evidence of Franklin's demise, and MacFarlane, who also left in 1857 from Fort Good Hope sponsored by the Hudson's Bay Company (Cooke and Holland, 1978, pp. 212-213). Clothing, like other supplies, was obtained from Company posts and by trade with native peoples. Small group travel by sledge and canoe made impossible the hoarding of a large supply base. They depended on supplies to be found at Hudson's Bay Company posts, trade with native people, and their own ingenuity and skills.

Footwear cases-Canadian: 1850-1860

The land expedition by Rae (1852) from Great Bear Lake indicates the footwear commonly used on land in the early 1850s.

The following cases represent footwear used by Canadians in this decade:

case 139 Esquimaux boots, p. 81
case 496 moccasins, p. 90
case 497 duffle socks, p. 90
case 498 native boots, p. 78
case 499 native boots, p. 78
case 500 sealskins, p. 78

No visual sources or surviving artifacts were located that could be utilized in establishing Canadian footwear cases.

Clothing documentation-British: 1850-1860

In contrast to the minimal provisions taken by small parties travelling by canoe, sled, or walking, are the large ship-based naval expeditions of this decade. Because of the meticulous record keeping practices of naval personnel, precise detail is available on clothing and other textile provisions available for usage.

Armstrong (1857, p. 70) describes the special polar clothing issued by the Admiralty as "consisting of one complete suit of blue double milled box cloth, boots, stockings, boothose, comforters, mitts and caps, all of excellent quality and well adapted for Polar service." While it has not been established to what extent each of these clothing articles was modified for usage in the extreme climatic conditions of the Arctic, it is known that fur caps were especially designed for wear by members of the ships HMS Investigator and HMS Enterprise, that left London in 1850.

Generally, before this decade there was no standard uniform for men in the British Navy. As pointed out by Dickens (1977) and summarized by Kerkhoven (Edmonton, n.d., unpublished report) men were encouraged to buy, from the ship's purser, suitable clothing upon joining the Navy. Since 1824 the Navy had suggested that the ship's slopchest stock blue cloth jackets, knitted worsted waistcoats, blue cloth trousers, white duck trousers and frocks, shirts, stockings, hats, mitts, blankets, and silk black handkerchiefs, along with sewing supplies such as needle and thread. With certain limits, the sailor could take goods from the slopchest with the cost of the clothing recorded for deduction from his pay at the end of the trip. While, as previously noted, the Admiralty did supply crew members on Arctic expeditions with one suit of clothing at no cost, along with furs for bedding, it appears that clothing designed according to Admiralty specifications especially for cold weather clothing conditions was increasingly available after 1850.

The question, then, is whether or not clothing available for men on extended voyages included all of the attire expected to be necessary upon leaving England, or, whether, as on previous expeditions, it was expected that they acquire clothing enroute for necessary protection from the cold. If acquired clothing was significant to the philosophy behind provisioning, it seems useful to establish the textile goods available for use on expeditions that entered the Canadian Arctic from the east via Greenland with those that circled the Horn, with a stop in Hawaii or other ports, before entering the western Arctic.

Robert John Le Mesurier McClure, on the ship HMS Investigator, and Richard Collinson, on the ship HMS Enterprise, left London in January, 1850, to search for Franklin by way of Bering Strait in the western Arctic. The two ships separated in the Pacific Ocean and did not meet again; Collinson's party reached Point Barrow, Alaska, could not go further east, went to Hong Kong to winter over, and the following year returned to Bering Strait. In the winters of 1851 and 1852 they remained at Victoria Island; in the winter of 1853 they stayed at Cambridge Bay, Alaska, and returned to England the following year.

Collinson (1889, p. 38) notes that "Clothes generally, supplied by the Admiralty, (are) not very satisfactory; not good enough material, and badly made." The total amount of clothing on board the HMS Enterprise has not been determined but Collinson does list the clothing and textile products utilized on sledging parties. Textile products included in the equipment are a 34 pound tent, drag ropes for the sledge, a 20 pound canvas boat, No. 7 canvas sail, a 20 pound mackintosh floor cloth, buffalo robes, felt sleeping bags, luncheon haversacks, knapsacks, and an ammunition bag. Clothes worn by the men that were supplied by the government were woollen drawers, box cloth trousers, woollen frocks, Welsh wigs[1] seal-skin caps, blanket foot wrappers, heeled boothose, canvas boots, deerskin moccasins, woollen grey mitts, seal-skin mitts, mufflers and spectacles. The men were responsible for supplying woollen shirts, sleeved waistcoasts, duck coats, heeled stockings, mitt socks, a comforter, duck trousers, face protectors and their own towels (Collinson, 1889, p. 386).

Clearly, clothing of this sort is what was standardly utilized at this period in time for it was found that a British Naval search expedition that came in from the east, leaving London and going through Lancaster Sound into the Canadian Arctic had much the same clothing supplies on shipboard. This was a group of ships headed by Horatio T. Austin, Eramus Ommanney, John B. Cator, and Sherard Osborn.

In listing the sledging equipment to be used by a search party made up of Austin's men in 1851, the same textiles are shown to be in use with only slight variation. Tent, floorcloth, wolf skin and felt sleeping bags, luncheon haversacks, knapsacks, a bag for sundries, gutta percha[2] or oil canvas casing with canvas botton, and cotton matches are included in the equipment on each sledge. An inside flannel, a Guernsey[3] frock, a serge frock, a duck jumper, a pair of drawers and a pair of breeches, a pair of overall duck pantaloons (tied above the calf), a waist belt, stockings, blanket feet wrappers, wadmil[4] hose and a pair of canvas boots with leather soles (that are made up on shipboard) made up the clothing ensemble for walking dress. In addition, a Welsh wig, a southwester, a comforter[5], a pair of mitts with lanyards[6], an eyeshade and a water bottle worn inside the frock were utilized. Each man on the sledging party would take along as spare clothing: an inside flannel, a pair of drawers, two pairs of stockings, two pairs of feet wrappers, another pair of canvas boots, possibly a pair of warm cloth boots, a cloth jacket, another pair of mitts, and a towel (Austin, Arctic Blue Book 45228, p. 13).

Francis Leopold McClintock was a member of Austin's group. From their base on Griffith Island, in Barrow Strait, he covered 1240 km in surveys by sledge. The lists of sledging equipment presented by McClintock (1852, Arctic Blue Book 45228, pp. 181-191) are similar to those just listed; however, he provides more detail. For example, he notes that the clothing supplies taken were expected to be sufficient for a 100 day stretch beginning in March, but in the fall beforehand certain goods had been cached in strategic locations. For each officer and six man crew sledging equipment was recommended that would include a tent with poles and sewn blanket bags, seven feet long and made of felt and two fur blankets. These items totaled 85 pounds; the fur blankets were recommended to consist of reindeer skin underneath with the upper blanket of wolf skin, total dimensions being 16 by 9 feet. Under this would be placed a mackintosh floor cloth, of 16 by 9 feet, and a 13 by 8 foot floor cloth of No. 7 canvas that could serve as a sail as well as a floor cloth.

Included as part of the medicinal supplies, a party would take calico and flannel bandages, and lint and cotton wool. A sundry bag would include awls, sail and sewing needles, twine, thread, spare soles, wax, bristles, nettlestuff, two yards of crape (Number 4 canvas?), shoe-tacks, cylinders, and white lead to render footwear waterproof. They also would include a few strips of canvas to use in tallow lamps, shot pouches and watergun covers, lashings and drag ropes made of "hair rope" for the sledge, and a gutta percha sledge top with three yards of No. 4 canvas. Knapsacks, which had been made on shipboard, were of No. 8 canvas. It appears likely that the felt sleeping bags were made on the ship as well.

The sledge boat was made of "the newly patented waterproof cloth, which can be obtained from Mr. Roberts, 32 Moorgate-street, and which has been tested in the Hudson's Bay Company's territories." The sledge lashing required about "20 fathoms of soft rope" (McClintock, 1852, Arctic Blue Book 45228, pp. 181-191).

The clothing recommended for wear by McClintock (1852, Arctic Blue Book 45228, pp. 181-191) on sledge journeys was flannel shirts, knitted woollen frocks, blue serge frocks, loose overall sealskin frocks, and a waist belt. The design of the frock was to resemble that worn "by the Esquimaux, but should have outside breast pockets." He recommended that the materials for these skin frocks be purchased from the Inuit and then be made up on shipboard. A Welsh wig, fur cape and crape veil,[7] woollen comforter and a pair of winter mittens completed the clothing assembly. The mitts were to be of "dressed deerskin, lined with duffle or blanket." On the feet, at the start of the journey, it was recommended to have a pair of stockings, blanket wrappers, wadmil boothose and "Canadian moccasins." The moccasins were to be "made of the thickest smoke-dressed mooseskin, and made of the largest size." The spare clothing that was taken along was to include more stockings, blanket feet wrappers, and moccasins, along with "Esquimaux sealskin boots," canvas boots with leather soles, and boothose (to be reserved for sleeping in). A letter from Hunt and Henley to McClintock (Arctic Blue Book 45228, p. 191) noted the price for the sealskin boots sent by the Laborador agent to St. John's: "The price in Newfoundland remains the same as for many years; say two dollars, equal to 8s. 4d. stearling per Pair."

McClintock (Arctic Blue Book 45228, pp. 181-191) describes one type of "easy boots" that could be manufactured on shipboard for the men. The canvas boots "can be made on board by any ordinary shoemaker. The soles should be of single leather, very broad, and sewn on 'pump fashion' as shoemakers term it; and they should be large enough to go on easily over 1 pair of stockings, 2 pairs of blanket wrappers, 1 pair of boot hose." McClintock emphasizes, in the same publication, the importance of having a supply of native boots as well.

> After the thaw has commenced, the Esquimaux boots are superior to everything else. They can be obtained from St. Johns, Newfoundland, through the Messrs. Hunt, 34, Great Winchester-street; but at least ten weeks notice should be given. It is also possible they may be obtained in time for a Barrow Straits Expedition, from the Hudson Bay districts, through Mr. Roberts, 32, Moorgate-street. It is difficult to get boots of this description sufficiently large for Europeans.

He also recommends that spare blanket wrappers "should not be cut off, but the blanket supplied to the party, and used for other purposes as required, until necessary to apply it as originally intended" (McClintock, 1852, Arctic Blue Book 45228, pp. 181-191).

Of significance to interpreting the value of certain clothing items and the surplus of these items is knowledge of the presence of specified articles and quantity of articles that were stored in caches for later utilization by the group or by others expected to visit the cache at a later date.

In April, 1852, Sir Edward Belcher left London with a fleet of five ships under his general command to look for Franklin and, also, to take supplies to Melville Island for Collinson and McClure's expedition parties. The ship HMS *Resolute*, captained by Henry Kellett, and the ship HMS *Intrepid*, captained by Francis McClintock, discussed previously as the head of earlier sledging parties, left the rest of the fleet and headed to Melville Island. They wintered at Dealy Island off its south coast.

Among the provisions landed at Dealy Island from the HMS Resolute in July, 1853, are 66 box cloth jackets, 66 pairs of box cloth trowsers, 122 Guernsey frocks, 108 pairs of knitted drawers, 63 pairs of Fisherman's boots, 132 pairs of boothose, 143 pairs of mitts, and 59 yards of crape fabric. This list was provided by W.H. Richards, the clerk in charge for landing of goods by Captain Kellett (1855, Arctic Blue Book 45245, pp. 81, 83).

Stores placed on Dealy Island in July, 1853, as listed by McDougall (1855, Arctic Blue Book 45245, p. 83), included 12 sail needles, one pound of twine, 30 fms of two inch rope, 20 pounds of spun yarn, four fms of six inch Junk, six shoemaker's awls, ¼ pound hemp, was, 12 yards of old canvas, nettlestuff[8], beeswax, hog bristles, a complete poop housing and two boats. Among the clothing and textile articles deposited upon the north side of Melville Island by Captain McClintock in July, 1853, were a mackintosh floor cover lined with blanket, nine felt sleeping bags, ten pairs of canvas boots, an ammunition bag, a canvas bag, four gutta percha depot cases, and unspecified clothing. All of this was stored on top of a sledge which was then covered entirely with a mackintosh cloth. Several miles away, a cart complete with drag ropes and lashings was left. Textile goods left on this cart were a "tent for 9 persons (fitted complete), 1 black waterproof cloth, 1 buffalo blanket... knapsack... 1 mackintosh, ammunition bag." The whole cart was then covered with the black floor cloth.

At the time that Captain Henry Kellett and McClintock were near Melville Island, the McClure party was trapped by ice at Mercy Bay on Banks Island. A sledge led by Lt. B.C.T. Pim located McClure and his crew and it was soon decided that the McClure party would abandon the ship HMS *Investigator*; most of its contents would be left at Mercy Bay. The stores and provisions were placed in a depot and the ship itself was left for future explorers to utilize.

Among the articles left at Mercy Bay, June 1, 1853, were 11 pairs of B.C. trowsers (No. 2), 150 yards of duck fabric, 40 pairs of stockings, 150 mitts, 30 caps, 25 Flushing jackets, 13 wrappers, 11 box cloth jackets, 12 pairs of box cloth trowsers, 21 Guernsey frocks, three pairs of Guernsey drawers, 25 pairs of box cloth boots, three pairs of carpet boots, nine pairs of sea boots, 27 pairs of sealskin boots, 47 pairs of sealskin gloves, 20 sealskin caps, eight pairs of boothose, 22 comforters, two Welsh wigs, one Southwester, and 30 yards of green crape, 32 blankets, 230 yards of flannel, 50 serge frocks, 64 yards of B.C. No. 2 for jackets, 25 yards of Flushing, seven pairs of half boots, 15 pairs of shoes, and 49 B.C. jackets (No. 2). In addition, as part of the Carpenter Stores, six boats and complete gear, plus a topmast, jibbon, and handmast were left behind (1855, Arctic Blue Book 45245, Proceedings of Captain McClure, p. 108).

A letter from Captain Kellett that details proceedings up to the 10th of February, 1854, also lists clothing and textile goods left in the western Arctic at this time (Arctic Blue Book 45245, pp. 74-86). The listing just cited by McClure summarized the goods left on land in the depot; Kellett lists both these and the goods remaining on board the HMS Investigator. Thus, these additional textile and clothing items were left at Mercy Bay: 11

blankets, 584 yards of flannel, 24 serge frocks, ten yards of blue cloth No. 2 for jackets, nine pairs of boots, 17 pairs of shoes, 174 yards of Duck, 26 pairs of stockings, 114 pairs of mitts, 12 caps, 74 yards of blue serge, 59 shirts, 31 beds (?), 122 black silk handkerchiefs, 12 Flushing jackets, 44 wrappers, 100 yards of green crape and three pairs of carpet boots.

Clearly, from the detail on the clothing and textile goods cached on Banks Island and Dealy Island one can see the wealth of textile materials for clothing manufacture for use by members of ship-based expeditions.

There is much evidence that footwear, especially, was manufactured on board ship. Johann Miertsching, translator for the McClure party, notes (1917, p. 102) "In the last few days I have made myself a pair of boots... also I have begun a new pair for the Captain. These boots are made of felt with cork soles." Armstrong (1857, pp. 490-491), the surgeon on the expedition, says that the men kept busy in the winters mending and making clothes for themselves and others. He states that some men became such excellent tailors and shoemakers that they took this on as a profession upon returning to England.

Native-made clothing was virtually of no importance in outfitting the men on expeditions led by McClure, Collinson, and McClintock; it appears insignificant to any of the well supplied Franklin search expeditions sponsored by the British Admiralty in this decade. The one possible exception to this is native-made sealskin boots purchased in bulk from agents, rather than by making personal contact with native communities.

Footwear cases-British: 1850-1860

Written documentary sources were highly abundant for ship-based expeditions in this decade. Belcher's (1855) written narrative has been emphasized in establishing the footwear types mentioned in written personal expedition reports. The cases collected from Belcher are:

case 176 travelling boots, p. 164
case 177 canvas boots with leather soles, p. 164
case 178 blanket wrappers, p. 237
case 179 travelling boots, p. 221
case 180 elastic socks, p. 237
case 181 fisherman's boots, p. 288
case 182 boot soles, pp. 284-289
case 183 carpet boots, pp. 284-289
case 184 boothose with leather feet, pp. 284-289
case 185 plain boothose, pp. 284-289
case 186 chamois leather moccasins, pp. 284-289
case 187 Esquimaux boots, pp. 284-289
case 282 waterproof composite, p. 288
case 283 sealskin (for boots), p. 38
case 284 waterskins (for soles), pp. 43-44
case 285 boots, pp. 43-44 & 164-165
case 286 moccasins, pp. 43-44 & 164-165
case 287 pup seal skin linings, p. 44
case 288 sandals of sail cloth, p. 78
case 289 stockings, pp. 92-93

Further cases have been taken from sources concerned with provisions for the ships HMS Investigator and HMS Enterprise. Collinson (1889) relates footwear used on the HMS Enterprise:

case 291 moccasins, p. 401
case 294 heeled boothose
case 295 canvas boots
case 495 deerskin moccasins

Footwear used by the crew of the ship *HMS Investigator* is recorded by McClure (1969), the Captain, and by Miertsching (1917), a German who served as translator. The cases are as follows:

case 114 cloth snow boot, McClure, p. 160
case 115 boots, Miertsching, p. 102
case 116 felt boots, Miertsching, p. 153
case 117 bed shoes, Miertsching

In addition to these data cases from written sources, 25 leather fragments have been located at archaeological sites on Banks Island, all of which are assumed to be pieces of shoe leather that remain as evidence of the footwear left by the *HMS Investigator* crew when abandoning the ship. These artifacts constitute footwear cases 145 through 169; they are housed in Edmonton, at the Department of Anthropology, University of Alberta.

The McClintock Cart Site (Dempsey, n.d., Glenbow-Alberta Institute Report, Calgary) on Melville Island has yielded a number of footwear artifacts. The footwear artifacts in this McClintock collection are:

case 296 partial canvas shoe, xpi-21077
case 297 shoe, xpi-21075
case 298 shoe, xpi-21076
case 299 sock fragment, xpi-21083
case 300 soles, xpi-21078
case 301 stockings, xpi-21091A
case 302 boots, xpi-21074
case 303 boot cleat, xpi-21079
case 304 sole fragment, xpi-21080
case 305 leather fragment, xpi-21081
case 306 cloth fragment, xpi-21082
case 307 stocking, xpi-21084

Three drawings published by Markham (1909) have been used as visual evidence of the footwear types utilized by the McClintock party. The footwear cases are:

case 4 mukluk-sandal boot, p. 106
case 5 boots, p. 122
case 113 moccasin-boot, p. 122

An additional footwear case taken from a visual source to represent this decade is case 327 (a shoe, Anonymous, 1852, p. 30).

It is highly likely that a number of the footwear artifacts located by Parks Canada are from this decade. The National Maritime Museum, in Greenwich, has some surviving examples of footwear utilized in the Canadian Arctic; the data have been derived from photocopies of accession sheets and, subsequently, these footwear cases have been assigned:

case 48 boots
case 82 boots, Arctic relic L9 (12)
case 84 boots, Arctic relic L5 (2)
case 142 moccasin, Arctic relic, "Store" QHP
case 143 moccasin, Arctic relic, L9 (13)
case 144 moccasin, M55/M #L5 (2)

The equipment list published by McDougall (1857, p. 495) provides insight into the types of footwear this expedition had available for use. The cases are:

case 170 heeled stockings
case 171 mitt socks
case 172 blanket wrappers
case 173 boot hose
case 174 canvas boots
case 175 moccasins

Footwear cases derived from the Blue Books, a source that compiles those Great Britain Parliamentary Papers that pertain to the arctic expeditions sponsored by the Admiralty, are numerous. The following cases have been extracted from Arctic Blue Book 45228:

case 103 canvas boots with leather soles, p. 13
case 104 warm cloth boots, p. 13
case 247 stockings, p. 12
case 248 blanket feet wrappers, p. 12
case 249 wadmill hose, p. 12
case 250 sealskin travelling boots, pp. 181-182
case 251 cloth boots, pp. 181-182
case 252 worsted stockings, p. 183
case 253 cloth boots, p. 183
case 254 stockings, p. 182
case 255 boothose footed with lambskin, p. 182
case 256 blanket socks, p. 182
case 257 spare soles, p. 182
case 258 shoe tacks, p. 182
case 259 white lead for waterproofing, p. 182
case 260 spare soles, p. 185
case 261 waxed ends, p. 185
case 262 shoe tacks, p. 185
case 263 stockings, p. 183
case 264 blanket feet wrappers, p. 183
case 265 wadmill hose, p. 183
case 266 Canadian moccasins, p. 183
case 267 stockings, p. 183
case 268 blanket feet wrappers, p. 189
case 269 moccasins, p. 189
case 270 Esquimaux sealskin boots, p. 189
case 271 canvas boots with leather soles, p. 189
case 272 boot hose, p. 188

Similarly, the following footwear cases have been compiled from Arctic Blue Book 45245:

case 201 blanket wrappers, p. 487
case 202 moccasins, p. 488
case 213 hemp soles, p. 78
case 214 fisherman's boots, p. 81
case 215 carpet boots, p. 81
case 216 boot hose, p. 81
case 217 canvas boots, p. 82
case 218 shoes, p. 84

case 219 boots, p. 84
case 220 wrappers, p. 84
case 221 boothose, p. 84
case 222 box cloth boots, p. 84
case 223 sealskin boots, p. 84
case 224 sea boots, p. 85
case 225 carpet boots, p. 85
case 226 half boots, p. 108
case 227 shoes, p. 108
case 228 wrappers, p. 108
case 229 box cloth boots, p. 108
case 230 carpet boots, p. 108
case 231 sea boots, p. 108
case 232 sealskin boots, p. 108
case 233 boothose, p. 108

Clothing documentation-American 1850-1860

The Americans had fewer parties in the Arctic than did the British from 1850 to 1860. It is during these years that American whalers first purposely wintered in Cumberland Sound (Cooke and Holland, 1978, p. 195). British whalers were doing the same and, although they were not discussed in the last section, more whalers in the Arctic were probably Scottish and English than American before this decade.

The most important American expeditions in this decade were the two Grinnell expeditions in the eastern Arctic. The first expedition left New York in 1850, sponsored by Henry Grinnell. Their two ships, the *Advance*, headed by Kane, and the *Rescue*, headed by Samuel P. Griffin, went to Wellington Channel and to Beechy Island. They became iced in and drifted into Wellington Channel; the ice then carried them out of Lancaster Sound and through Baffin Bay at which time they were released from the ice. At this time they returned home.

Kane (1854, pp. 263-264) discusses the clothing assembly worn:

> I give in detail my dress, the result of much trial, and, I think, nearly perfect. Here it is, from tip to toe.
>
> 1. Feet. A pair of cotton socks (Lisle thread) covered by a pair of ribbed woolen stockings, rising above the knee and half way up the thigh. Over these a pair of Esquimaux waterproof boots, lined by a sock of dog-skin, the hair inside; the leg of dressed seal-hide; a sole with the edges turned up, and crimped so as to form a water-tight cup; the furred edge of a dogskin sock inserted as a lining; and some clean straw laid smoothly at the bottom which forms the elastic cushion on which you tread.
>
> 2. Legs. A pair of coarse woolen drawers, and a pair of seal-skin breeks over them, stitched with reindeer tendon.
>
> 3. Chest. A jumper or short coat, double, of seal-skin and reindeer fur. This invaluable artical I got at Disco on my fur journey, obtaining a good number besides for my men and officers. It consists of an inner-hooded shirt of reindeer-skin with the hair inside, reaching as far as the upper ridge of the hips, so as to allow free swing to the legs, and fitting about the throat very closely. It is drawn on like the shirt, and, except at the neck, is perfectly loose and unbinding.
>
> 4. Head. Our people generally wear fur caps. I wear an ear-ridge, a tiara, to speak heroically, of wolf-skin. Excellent is this Mormon fur. Leaving the entire poll bare to the elements, it guards the ears and forehead effectually: in any ordinary state of the wind above -15, I am not troubled with the cold. Before I resorted to this, my cap was full of frozen water, stiff and uncomfortable, all the condensation turning to ice the moment I uncovered. When the weather is very cold, I up hood; when colder, say -40, with a middling breese--quite cold enough, I assure you--I wear an elastic silk night-cap in addition, one of a pair forced on me by a certain brother of mine as I was leaving New York, drawn over my head and face, and lined with a mask of wolf-skin. To prevent excessive condensation, I cut only two eye-holes, and leave a large aperture below the point of the nose for talking and breathing. A grim-looking object is this wolf-skin mask, its opening lined with water-proof oiled silk.

> The only changes in the above are a pair of cloth pants for fur, when the thermometer strays above -15, and a pair of heavy woolen wad-mail leggins, drawn over my fur pants, and worn, stocking fashion, within my boots, in windy weather, when we get down to -30 or thereabouts. A long waist-scarf, worn like the kummerbund of the Hindoos, is a fine protection while walking, to keep the cold from intruding at the pockets and waist; it consummates, as it floats martially on the breeze, the grotesque harmonies of my attire.

The men did much of their own sewing, and it appears that they had more imagination than tailoring skills when it came to manufacturing what it was that they needed. Kane writes:

> I wish some of my soda-water-in-the-morning club friends could see me perspiring over a pair of pants, dorcassing a defunct sock. We do our own sewing, clothing ourselves cap-a-pie; and it astonishes me, looking back upon my dark period of previous ignorance, to feel how much I have learned. I wonder whether your friend the Philadelphia D'Orsay knows how to adjust with a ruler and a lump of soap the seat of a pair of breeches?
>
> Why, I have even made discoveries in-I forget the Greek word for it-the art which made George the Fourth so famous. Thus a method, adopted by our mess, of cutting five pair of stocking out of one hammock blanket--a thing hitherto deemed impossible--is altogether my own. In the abstract or speculative part of the profession, I claim to be the first who has reduced all vestitute to a primitive form-an integral particle, as it were. I can't dwell on this matter here; it might, perhaps, be out of place; perhaps, too, attributed in some degree to that personal vanity almost inseparable from invention. I will tell you, however, that this discovered type, this radical nucleus, is the 'bag.' Thus a bag, or a couple of parallelogramic planes sewed together, makes the covering of the trunk. Similar 'bags' of scarcely varied proportion cover the arms; ditto the legs; ditto the hands;

> ditto the head; thus going on, bags, bags, bags, even to the fingers; a cytoblastic operation, having interesting analogies with the mycelium of the fungus or the saccine vegetation of the confervas. (Kane, 1854, p. 366)

The second Grinnell expedition was under the auspices of the U.S. Naval Department with the personnel being made up of ten Navy men and the rest volunteers. Supplies not taken from New York were obtained in St. John's, Newfoundland. The equipment taken was very simple compared to that of a British expedition. For wintering over, boards to build a shelter, along with some tents of India rubber and canvas were taken; buffalo robes were brought for sleeping. Clothing was primarily of woollens but knives and needles were taken along specifically to barter with the native peoples. Skins and sewn fur garments were then secured at stops along the Greenland coast. Clearly the group tried to get all of the native-made clothing possible. Kane (1857, Vol. I, p. 29) says:

> I also purchased all that I could get of the crimped sealskin boots or moccasins, an admirable article of walking gear, much more secure against the wet than any mode of sewing.

While, almost certainly, the native-made footwear was of sewn construction, this demonstrates the lack of Kane's knowledge of basic clothing manufacture techniques. At various stops, provisions were left on land in depots (Kane, 1857, Vol. I, pp. 5, 20-29, 89, 108). Kane stresses the simplicity of strategies used on sledging trips:

> The personal equipment of the men was a buffalo robe for the party to lie upon, and a bag of Mackinaw blankets for each man to crawl into at night. India rubber cloth was to be the protection from the snow beneath. The tent was of canvas, made after the plan of our English predecessors. We afterward learned to modify and reduce our travelling gear, and found that in direct proportion to its simplicity and our apparant privation of articles of supposed necessity were our actual comfort and practical efficiency. Step by step, as long as our Arctic service continued, we went on reducing our sledging outfit until at last we came to the Esquimaux ultimatim of simplicity,-raw meat and a fur bag. (Kane, 1857, Vol. I, p. 114)

Kane and his men had much contact with the native communities along the Greenland coast. Kane (1857, Vol. II, p. 24), while discussing clothing practices, states that "experience has taught us to follow their guidance in matters of Arctic crafts; but we have to add a host of European appendages to their outdoor clothing." Nonetheless, the clothing is basically native in material and design. Kane (1857, Vol. II, p. 165) describes his own clothing as "a pair of sealskin pants, a dog-skin cap, a reindeer jumper, and walrus boots."

As they prepared to leave ship and seek rescue, having been in the Arctic much longer than planned, the men spent much time manufacturing clothing to meet their needs. Eider-down had been collected, picked over, and quilted into coverlets using woollen curtains that had separated the berths (Kane, 1857, Vol. II, pp. 167, 313). Canvas moccasins and boots made of carpeting, with soles of walrus and seal hide or leather taken from the chafing-gear of the brig, were made. Each man made his own body clothing from blankets. Provision bags were constructed of "sail-cloth made water tight by tar and pitch, which we kept from penetrating the canvas by first coating it with flour-paste and plaster of Paris" (Kane, 1857, Vol. II, p. 168).

The men, with much hardship, made their way to Upernavik, a Danish settlement on Greenland that received its supplies each year by way of an annual trading ship from Denmark. From Upernavik the crew went on a small Danish boat to Godhavn with only "the furs on our backs, and the documents that recorded our labors and our trials, it was all we brought back of the Advance and her fortunes" (Kane, 1857, Vol. II, p. 296).

Footwear cases-American: 1850-1860

All of the American footwear cases come from Kane (1857). These are from Volume I:

case 205 boots, p. 365
case 206 sealhide socks (buskins)
case 332 sealskin moccasins, pp. 28-29
case 334 socks, p. 89
case 336 walrus boots, pp. 165-166
case 337 shoe, p. 169
case 338 canvas shoe, p. 173
case 339 fur socks, p. 173
case 240 moccasins, pp. 187, 361

Written cases that come from Kane (1857), Volume II are:

case 341 boots, p. 21
case 342 footed trousers, p. 99
case 343 canvas moccasins, p. 168
case 344 boots, p. 168

case 345 socks, p. 181
case 346 native boots, p. 234
case 347 blanket socks, p. 313

No examples of surviving footwear artifacts worn in this decade by American explorers have been located.

Clothing documentation: 1860-1870

With the finding of Franklin relics by William Penny and John Rae in the 1850s, the British reduced the number of Franklin search expeditions to the Canadian North. Hudson's Bay Company supply voyages continued coming from London to Moose Factory and York Factory. Fort Anderson was established in 1861, though it lasted only until 1866; it had been built exclusively for Eskimo trade (Cooke and Holland, 1978, pp. 220-221). In 1869 the Hudson's Bay Company built Fort Providence on the Mackenzie River and Rampart House on the Porcupine River. Thus, the Hudson's Bay Company continued to strengthen its hold in the North and was the prime source for obtaining goods commercially. Textile materials and tools, along with manufactured clothing, were distributed in the North through these established posts.

While the British did have whaling ships present in the Canadian Arctic at this time, the Americans had become the predominant group. By 1860, whaling in the Canadian North had increased in importance, with 59 American whaling ships frequenting Hudson Bay from 1860 to 1870. During the years 1860 through 1862, Charles Francis Hall and S.O. Budington were on a combined

Franklin search-whaling expedition, having left from New York. In 1864 Hall left a second time to search for Franklin relics, taking with him two Inuit friends he had acquired on his first voyage. After five years in the Arctic, he returned to New Bedford, Massachusetts, with the whaler Captain Fisher (Cooke and Holland, 1978, pp. 223-224).

The men on expeditions led by Hall placed emphasis on native-made clothing and footwear. For example, Hall states that "the native boots on my feet were made fast by strong thongs of sealskin," and "thanks to my Esquimaux boots, which had been well 'chewed' by the native women..." (Hall, 1970, p. 113). Natives, present on shipboard, dressed and sewed sealskins to make clothing for the men (Hall, 1970, pp. 124, 210), as well as keeping clothing in repair. Hall wrote:

> Puto and Miner's wife have been mending my kumings (native boots) this morning, that I may go dry-shod to the vessel, as we anticipate water travelling (June 29, 1861). (Hall, 1970, p. 297)

When Hall travelled by dog sledge to Grinnell Bay he mentions that the outfit for the trip consisted of a double wool blanket, a sleeping-bag, a cloak and a shawl for covering the bed. He goes on to say: "For clothing besides my native dress upon me, I took 1 extra undershirt, 1 woollen shirt, 2 pairs extra stockings, 1 pair extra pants, 2 towels, and 2 pair of mittens" (Hall, 1970, p. 168).

In describing a man from the party who had become lost and subsequently frozen to death, Hall said:

> Every article of John's clothing was in its place-his hands mittened-his head, ears and nose protected as well as they could be by a Russian cap-his feet shielded by native boots and stockings and his body well clothed in woollen garments over which was his seal-skin jacket. (Hall, 1970, p. 209)

As had been discovered decades earlier, tight leather boots presented frost bite problems to the wearer. Hall (1970, p. 210) noted that the Captain, suffering from the cold when it was 49 degrees below the freezing point, said:

> [he] had unfortunately ventured out with a pair of civilization boots, having found his native ones too small. On return passage he got Johnson to pull off one of his boots, as he found one foot freezing.

In general, however, one can say that the American expeditions led by Hall primarily utilized native-made clothing.

A group very active in the western Arctic in this decade was missionary personnel. In 1859 Reverend William Kirby established an Anglican mission in Fort Simpson and from here he made trips to Fort Yukon. In 1862, Father Seguin, a member of the Oblate of Mary Immaculate, one of the largest missionary congregations of the Roman Catholic Church, came to Fort Good Hope; he also made a trip to Fort Yukon. The Catholic mission at Fort Good Hope had been established by Father Henri Grollier, who stayed in the North until he died in 1863. With his death, Father Petitot, also an Oblate, came to Fort Good Hope to replace him. Father Petitot made many journeys in the region bounded by the Coppermine River and the Rocky Mountains, Great Slave Lake, and the Arctic Ocean (Cooke and Holland, 1978, pp. 214-232).

Drawings by Father Petitot (1970, pp. 71, 98) portray the Catholic missionaries at this time wearing native-styled, and undoubtedly, native-made clothing. Jackets portrayed are of skins with hoods, fringe, and what appears to be bead work. The jackets are designed as pullovers and go to a point in the front. Moccasins are used with snowshoes; the clothing pictured is of Loucheaux design (Petitot, 1970). However, because of the number of Hudson's Bay Company posts in the Mackenzie area, one can be assured that imported clothing and textile supplies coming into the western Arctic for commerce were of great importance to all in the region, native and non-native alike.

Footwear cases: 1860-1870

All of the recognizable footwear cases gathered from 1860 through 1869 that pertain to ocean travel come from Hall's (1970) book Life with the Esquimaux. The written cases are:

case 67 native boots, pp. 113-114
case 68 fur stocking
case 69 stockings, p. 168
case 70 native boots, p. 209
case 71 civilization boots, p. 210
case 72 native boots
case 73 native boots, p. 294

The sources taken from illustrations are:

case 45 mukluk-sandal boots, frontspiece
case 46 mukluk-sandal boots, "Hall on his..."

case 47 native boots, "The lost found-frozen dead"
case 66 mukluk-sandal boots

Although the footwear is not clear in this painting, Case 57 comes from artwork by Bradford (1866) entitled "Sealers Crushed by Icebergs," housed at the Old Dartmouth Historical Society in New Bedford, Massachusetts. It was included so that the total clothing assembly of sealers from this decade might be recorded. Drawings from the sketch books of American whalers in Hudson Bay were viewed (Sharon, Massachusetts, Whalers Sketch Books) and the sketches all showed the men wearing sea boots. They were not given case numbers, however, because the drawings were done south of the Arctic Circle.

In the western Arctic, Petitot (1970) provided two drawings that give information on the attire worn by Catholic missionaries during this decade. These are:

case 329 unrecognizable, Vol. II, p. 71
case 330 moccasin-boot, Vol. II, p. 98

No surviving artifacts were located from this decade.

Clothing documentation: 1870-1880

The best known expeditions of this decade were bent on reaching the North Pole. These were the United States North Pole Expedition, on the ship Polaris, headed by Hall, Budington, and George E. Tyson. The British expedition to the Pole was led by George S. Nares on the HMS Alert and Henry F. Stephenson on the HMS Discovery.

Leaving New London in July, 1871, the Polaris sought to go to the Pole by way of Smith Sound, making winter headquarters at Thank God Harbour in northwest Greenland. Hall did some sledging out from the ship on his expedition but died that November. A drawing by H.H. Nichols (Davis, 1876, p. 82) of the members of the crew pulling his body on a sledge before burial illustrates the mean wearing pullover jackets, probably of fabric, hip length, slightly pointed in front, and with a pointed hood. A similarly designed clothing ensemble is pictured (Davis, 1876, p. 134) in a drawing of men hunting musk-oxen in September of 1871.

After Hall's death, a number of problems were encountered by the remaining crew when their ship, the Polaris, sank and they had to leave by small boat. Meanwhile, in June, 1873, a relief expedition left New York to search for the missing expedition. The two ships followed the Greenland coast, one of them searching Melville Bay; it found nothing, and returned to New York. The other ship, the Tigress, entered Smith South, located Foulke Fjord where the Polaris had wintered in 1872-73, near where the Polaris had sunk. The Tigress then went back to Upernavik, Greenland, and on to New York (Cooke and Holland, 1978, pp. 235-236).

This relief expedition had deposited provisions on the Greenland coast. Upon a request from the Admiralty, the U.S. Government gave permission to the British to make use of these stores by the upcoming Nares expedition. The astronomer on the United States North Polar Expedition listed, for the Admiralty, the goods cached at various locations. Writing in January, 1875, Bryan listed the goods left at three different depots, that of Cape Sumner, Thank God Harbour, and Lifeboat Cove.

The clothing deposited in Thank God Harbour was listed by Bryan as one case of men's stoga boots,[10] 1/2 cases of men's kip boots, 1/2 case of leather gaitors, one case of pea coats, two dozen blue flannel over-shirts, two dozen drawers, one dozen grey heavy under-shirts, one dozen grey drawers, two dozen black silk handkerchiefs, one dozen blue Navy trousers, two dozen long woollen stockings, two dozen short socks, two dozen blue flannel under-shirts, two dozen woollen mittens, two dozen woollen comforters, one dozen Russian caps, six tarpaulin hats, and two dozen white linen frocks.

Textile goods listed were three pounds black linen thread, three pounds white linen thread, 1/2 pounds black sewing silk, one 1/2 pounds (?) papers needles, five pounds woollen yarn, two bolts No. 1 cotton canvas, one bolt Ravens duck, one section main deck awning, four sewing and roping palms, three pounds flax sewing twine, three pounds cotton, two pounds beeswax, and 50 assorted sail needles. Among the ordinance stores were one dozen leather belts, ten bags containing shot, six cod lines of 60 fathoms each, and three coils of halibut line.

Bryan, in noting the deposit at Thank God Harbour, wrote that "the Esquimaux know where it is, and if they have not disturbed it would readily lead one to it" (Great Britain, 1875, Stores sent by the U.S. Government, Blue Book 45251, pp. 28-32).

Bessels, Chief of the Scientific Department on the expedition wrote from the Smithsonian, that a cache could be located at the highest point of Lyttleton Island; no clothing articles were listed, however. At Thank God Harbour he cited the same supplies that were summarized in the list submitted by Bryan.

Bryan also listed the provisions taken by Hall's men when seeking rescue. The clothing and textile articles mentioned by him as being taken by the men leaving the sinking Polaris ship are: six sleeping bags, one tent, a boat cover, 17 goggles, seven rubber blankets, one ball of spun yarn. When the men left their small boats to proceed on foot it was not recorded what was left with the boats, a whaling boat and a "Heggleman" canvas boat which were left at Cape Sumner (Great Britain, Blue Book 45251, pp. 32-34).

Many written descriptions exist of the activities of the crews on the British ships HMS Alert and HMS Discovery. This expedition left Portsmouth in May, 1875, and proceeded to stop at Upernavik, then, they went on to Smith Sound and Ellesmere Island. Winter headquarters for the ship HMS Discovery was Discovery Harbour, on the northern side of Lady Franklin Bay, while the HMS Alert stayed at Floeberg Beach. Depots were established at Cape Joseph Henry by autumn travelling parties, while spring (1876) sledging parties headed north along the coasts of Ellesmere Island to Greenland. While not ever reaching the Pole, the two groups did manage to return safely to England, although scurvy was a serious health problem (Cooke and Holland, 1978, p. 239).

Clothing lists contained in Arctic Blue Book 45256 (p. xxxiii) enumerate large quantities of clothing taken on the expedition. For the ship HMS Alert alone the following clothing items were supplied: 240 pairs of grey mitts, 120 pairs of wool mitts, 180 knitted frocks, 70 sealskin jackets, 70 pairs of sealskin trowsers, 70 sealskin caps, 75 pairs of sealskin mitts, 200 moccasins, 63 box cloth jackets, 125 pairs of box cloth trowsers, 120 Hudson's Bay blankets, 180 pairs of white milled hose, 180 leather mitts, 20 Welsh wigs, 12 down shirts, 50 pairs of Fisherman's boots and 35 spare soles, 35 spare heels for the Fisherman's boots, 70 cloth boots with cork soles, 35 spare soles and 35 spare heels for these boots, 160 double flannel helmet caps, 12 respirators, 96 caps, and 120 pairs of gloves.

Textile supplies on board the HMS Alert included 30 pounds of thread in various colors, 60 thimbles, 2500 needles, over five pounds of hemp, two pounds of shoemaker's wax, one pound of bristles for shoemaking, 12 tins of waterproofing, and 30 spare soles and 30 spare heels for half-boots. Based on this (for half-boots themselves were not included in the list), it is probable that other clothing supplies were present that remain unlisted. The ship HMS Discovery carried very similar quantities of the same supplies.

It is not known to this researcher whether the Nares crew made use of any of the supplies cached by the Americans that have been previously mentioned. It is known that, as on previous arctic voyages, the personnel on British ships made many of their clothing articles. As an example, some footwear housed at the Scott Polar Research Institute (Accession number 51/1/14a & b) is described as "Canadian moccasins as supplied with shirt sleeves to make moccasin boots." Also, different jobs on shipboard, of course, demanded different clothing designs. Nares (Ottawa, M.G. 29 B12 Vol 3) recommends that the cook use large fearnough[11] boots worn over ordinary foot apparel for warmth while he performed his duties.

Drawings of the Nares expedition (Moss, pp. 11, 41, 42) illustrate men wearing fabric coats that button up the front, of hip length. Closures on the coats are with either one or two rows of buttons. Coats appear to be hooded but it is not clear if all of the coats are hooded.

During this decade the Hudson Bay supply voyages continued to bring goods to Canada from England via Hudson Bay. The British sent out exploration parties, in addition to that of the Nares group, and both British and American whaling fleets continued to work in the Canadian Arctic. The United States Army planned an expedition to establish a scientific colony on Ellesmere Island in 1877, and in 1878 the American Geographical Society sponsored Frederick Schwatka to do a follow up Franklin search expedition (Cooke and Holland, 1978, pp. 232-244).

Footwear cases: 1870-1880

Two cases were recorded from Hall, 1876, to represent the total clothing assemblage utilized by an American expedition in this decade. These are:

case 41 unrecognizable footwear, p. 182
case 42 unrecognizable footwear, p. 184

The following data cases pertain to footwear contained in the American Government Store at the port of Disco, in Greenland. The information was obtained, at the request of the Americans, from Danish Government officials, by Captain Nares of the British Royal Navy. For this reason the information was recorded in an equipment list published in Arctic Blue Book 45251. The cases are:

case 203 shoes, p. 14
case 204 boots, p. 14
case 208 stoga boots, pp. 31, 33
case 209 kip shoes, p. 31
case 210 leather gaitors, p. 31
case 211 long woollen stockings, pp. 31, 33
case 212 short socks, pp. 31, 33

Arctic Blue Book 45256 mentions the following types of footwear, all cases are from a list found on page xxxiii which is a list of "Provisions of Medical Comforts supplied to and returned by the Arctic expedition ships HMS Alert and HMS Discovery." The cases that have been assigned are:

case 189 moccasins
case 190 white milled hose
case 191 grey milled hose
case 192 Fisherman's boots
case 193 spare soles
case 194 spare heels
case 195 cloth, cork-soled boots
case 196 spare soles for cloth cork-soled boots
case 197 spare heels for cloth cork-soled boots

Data case 101 pertains to the fearnough boots, recommended by Nares (Ottawa, Nares papers).

All visual sources pertaining to British footwear usage in this decade are based upon the Nares expedition. Three cases come from the September 11, 1875, issue of The Graphic. They are:

case 15 spats, "serving out lime juice"
case 16 boots, "The Alert near Holsteinburg"
case 18 shoe, pp. 556-557

Case 17, a shoe, is taken from the illustration "The Arctic expedition is packing up sledges for a start" in the May 29, 1875, edition of The Graphic. The Graphic Arctic Number that was published November 8, 1876, provides additional footwear cases. These are:

case 19 boots, "Brushing off snow after a walk..."
case 20 boots, "...an invalid in the sledge..."
case 21 boots, p. 15
case 22 boots, p. 14
case 23 boots, p. 17
case 24 boots, p. 30
case 25 boots, p. 31

Additional illustrations were viewed in Moss (1878). While it was difficult to distinguish footwear types, these cases were important for establishing the total clothing assembly:

case 27 boots, Plate III
case 28 boots, Plate IV
case 29 boots, Plate VI
case 30 boots, p. 42
case 31 boots, p. 47
case 32 unrecognizable, Plate XI
case 33 unrecognizable, Plate XII
case 34 blanket wrappers, p. 58
case 35 leggings, Plate VIII
case 36 boots, Plate XV
case 111 moccasins, p. 58

Photographs held in Ottawa at the Public Archives of Canada also illustrate footwear used on the Nares expedition. These are:

case 424 boots, C-4588
case 425 boots, C-52547
case 425 boots, C-52547
case 426 boots, C-52571

A number of surviving footwear artifacts from the Nares expeditions have been located. Housed at the Scott Polar Research Institute, in Cambridge, England, are:

case 1 moccasin-boots, 51/1/14a & b
case 2 moccasin-boots, acq. 992
case 101 inner sole, 51/1/14a & b

The following cases are from the National Museum in Greenwich, England. Data have been taken only from accession sheets as the footwear has not been personally viewed by the researcher. The cases are:

case 50 Wooton boots
case 83 Arctic relic, no accession number

case 140 slipper, SR69/32 L9(56)
case 141 1 piece boot and trowsers, "Store" QHB

Clothing documentation: 1880-1890

The Hudson's Bay Company continued to send supply ships from London to Moose Factory, York Factory, and Churchill and they continued to monopolize all trade in the Northwest Territories at this time. Clothing goods obtained in the area, not purchased directly from native peoples, thus were handled at Hudson's Bay Company posts.

Whalers and sealers still were present in the Canadian North, although their numbers were far less than they had been ten years earlier. The whaler, Aurora, for example, that had come to Lancaster Sound from Dundee, Scotland, appears to be typical of arctic whaling voyages. Wm. Steven & Son, the sponsoring company in Dundee, hired a small crew locally. The ship then sailed on to St. John's where men were hired to go on board. While the Scottish men appear to wear typical sea boots, the Newfoundland men had footwear of a design which had evolved to meet northern Canadian conditions. Lindsey (1911, p. 45) notes that:

> Newfoundland men... all wore boots made of untanned sealskin, from which the hair had been removed. They were very light and serviceable and came up to the knee. Spikes were driven into the sole to prevent slipping on the ice, and the decks were preserved from these by plank sheathing.

Although whaling had occurred in Plover Bay and St. Lawrence Bay, Siberia, from 1850 on, it was not until 1889 that non-native whalers went into the western Canadian Arctic. Joseph Tuckfield wintered at Point Barrow, Alaska, but reported the Mackenzie Bay whaling ground after travelling there with some Inuit. This set the scene for the frenzied whaling activities off Hershel Island in the next decade (Bockstoce, 1977, p. 113).

Activity in the North rapidly increased in this decade. The Canadian Department of Marine Fisheries and the Geological Survey of Canada sent expeditions to explore the area around Hudson Bay; these expeditions generally left from Halifax. The Canadian Government sent parties from Ottawa to learn more about the Yukon.

In 1882-83 the First International Polar Year took place and meteorological and magnetic stations were set up and manned at Fort Rae, Cumberland Sound, Baffin Island, and Lady Franklin Bay on Ellesmere Island. This last station was the responsibility of the United States and Adolphus Washington Greely left New York in June of 1881 to take a party to establish the station; the men were all members of either the U.S. Army or Cavalry.

Regulation clothing and camp equipment were furnished by the Quartermaster-General of the United States Army. Additional footwear was sought in Canada and the group photographer was sent out to purchase necessary gear (Greely, Vol. I, pp. 1-2); it is unclear if he was successful. Stops were made in Newfoundland and Greenland, where "a few articles of fur clothing were obtained by barter--

the only possible manner. It had been hoped that skin clothing could be obtained at Upernavik but it was unavailable except by a delay of ten days to two weeks" (Greely, Vol. I, p. 3). Some of the goods that had been cached at Thank God Harbour were used by the men; the items listed were: three felt coverlets, and a waterproof floor cloth for a five-man tent (Greely, Vol. I, p. 147). The bedding materials, known to be used by the men, were heavy. For taking on sledge two sleeping bags were mentioned, a sheepskin bag weighing 34 pounds and a dogskin bag weighing 16 pounds. A load for one dog sledge included one two-man sleeping bag (82 1/2 pounds), one single dogskin sleeping bag (14 pounds), one rubber blanket (6 1/2 pounds) and three clothing bags of about 24 pounds (Greely, Vol. I, pp. 124, 193).

Three relief expeditions were sent from St. John's in attempts to take supplies to the party of 25 men. Each failed to reach Greely's party. Greely and his men thus had to abandon the establishment they had set up, Fort Cougar, in August, 1883. They began a retreat by boat but only got as far as Cape Sabine where they had to winter over. Only seven survivors were left when the group was rescued in June, 1884.

When the men left Fort Cougar, on Grinnell Island, each was allowed to take a bag with eight pounds of clothing. Greely (Vol. I, p. 230) has provided a composite list of what a man would be wearing and have in his bag.

These are: cloth caps, sealskin trousers, woollen trousers, canvas frocks, flannel or woollen shirts, drawers, guernseys, sealskin mittens, woollen mittens, dogskin mittens, woollen coats, and blanket vests. Greely comments that the men made many of the articles themselves out of blankets. Footwear included: sealskin boots, buckskin moccasins, woollen socks, blanket wrappers, dogskin and deerskin temiaks and deerskin stockings.

One would expect that, with stops by the Greely ship in St. John's, clothing and textile products in use might have been procured in Newfoundland. Several days research at the Provincial Archives of Newfoundland by the researcher could not substantiate this idea.

Footwear cases: 1880-1890

Most of the footwear data gathered to represent this decade comes from American expeditions. The Greely party, in the eastern Arctic, was highly important during these years and a number of cases have been taken to represent this. These are:

case 44 boots, Schley and Soley, frontspiece
case 105 mukluks, Brunswick, photo, GR-19 Box 1
case 106 boots, Brunswick, photo, GR-22 Box 1
case 488 unrecognizable, Greely, Vol. I, p. 1
case 489 sealskin boots, Greely, Vol. I, p. 230
case 490 canvas shoes, Greely, Vol. I, p. 230
case 491 buckskin moccasins, Greely, Vol. I, p. 230

Recommended footwear for polar travel, as suggested by Greely, is listed by Collinson (1889). These footwear types are:

case 290 knit woollen socks, p. 401
case 292 Greenland boots, p. 401
case 293 fur inner soles, p. 401

Melville's expedition (1885) is an example of a group that travelled the Pacific Ocean to go to the Arctic. Although this group explored Siberia rather than western Canada, it was felt that the footwear cases offered insight into American outfitting for the western Arctic in this decade.

case 478 moccasins, p. 38
case 479 boots, pp. 44-45
case 480 knit stockings, pp. 488-489
case 481 sealskin moccasins, pp. 488-489
case 483 felt foot nips, pp. 491-492
case 484 felt inner sole, pp. 491-492
case 485 canvas inner sole, pp. 491-492
case 486 rubber sandals, pp. 491-492
case 487 hay for water boots, pp. 491-492

Lindsey (1911) provides insight into the footwear used by whalers embarking from Scotland. The cases are:

case 242 sea boots, p. 26
case 243 boots, p. 45
case 244 sea boots, p. 14
case 245 sea boots, pp. 158-159

The cases listed above represent both written and visual documentary sources. No examples of surviving footwear artifacts were viewed.

Clothing documentation: 1890-1900

The Geological Survey of Canada sponsored a number of expeditions to the North during these years. In the sub-Arctic, Joseph Burr Tyrrell and D.B. Dowling went from Saskatchewan, travelling 2000 km overland by canoe in 1892, across central Canada. In 1893 Tyrrell and his brother, James, explored the interior of the Keewatin District, in the same manner, accompanied by three Indians from Quebec, and some Metis from Prince Albert and Fort McMurray.

All of their necessary supplies were ordered from the Hudson's Bay Company in Edmonton; probably this included the hats with attached mosquito netting that they found necessary to wear once mosquito season had begun (Tyrrell, 1908, p. 50). Clothing supply for the men was supplemented by trade with native people; it does not appear that the Geological Survey furnished clothing to their employees for field work at this time.

Much the same type of exploration was occurring in the east. From 1892 through 1896, Albert P. Low was exploring the Quebec-Labrador peninsula. A few years later, during 1898 and 1899, he conducted northern reconnaissance, travelling by dogsled in the area of Great Whale River. At about this same time, the geologist Robert Bell left from Halifax on the ship Diana, sent by the Department of Marine and Fisheries, to investigate the navigability of Hudson Strait. Bell was dropped off and spent two months surveying Baffin Island, before being picked up by the same ship in September (Cooke and Holland, 1978, pp. 264-274).

Clothing worn by the geologists surveying the eastern Arctic on these particular ships has not been established by the researcher, due to a lack of available documentary resources. However, a number of photographs of the Low expedition of 1904 portray the outer clothing in detail and it appears that the attire did not differ significantly five years earlier. The clothing worn by Low and his associates will be discussed in a later section.

The focus of exploration in the 1890s was in the western Arctic and, clearly, most supplies, including textile and clothing articles, were obtained from the Hudson's Bay Company posts. For example, Warburton Pike (1892) left from Fort Resolution to explore the Back River and to hunt musk-oxen; he was in the company of James MacKinley, the Hudson's Bay Company officer in charge of Fort Resolution. Frank Russell (1893, 1898), who was in the Mackenzie area to obtain musk-ox specimens for the collections of the University of Iowa, obtained all of his supplies from the Company. He says:

> Before leaving Winnipeg I had obtained a letter of credit from the Hudson's Bay Company... which enabled me to obtain supplies from any post in the Cumberland District,--embracing the Lower Saskatchewan and the country northward to Reindeer Lake. Trade with the natives is carried out by barter. There is no (money) in circulation though values are reckoned in dollars and cents. (Russell, 1898, p. 2)

Edmonton was the major place were Russell purchased his provisions, but, his close contact with the natives exemplifies the manner in which many explorers fulfilled their clothing needs. At Fort McPherson Russell (1898, pp. 137-138) notes that "plain moose skin moccasins were valued at one skin, beaded ones, two skins, plain moose skin hunting shirt, four skins, ornamented with fringe, ribbon, and quills, ten skins." A Loucheux woman at the post asked 50 skins for a traditional Loucheux garment "of white caribou skin, as soft as chamois leather... trimmed with quill-wrapped fringe and beads." Clothing such as this was available for purchase by either natives or non-natives through the Hudson's Bay Company post, the post serving as an outlet for both Indian-made and British-made goods.

Russell began his journey from Fort Rae, 60 miles north of Great Slave Lake, travelling by dog sled with 11 Dog Rib Indians; the journey got a later start than he had planned because the Dog Ribs first had to make "new snowshoes, sled, liners, and moccasins" for the expedition party. Russell's bedding for the journey was "a single four-point blanket sewed to a light deerskin robe (1970, p. 9). He also mentions that he "used a sleeping bag made of woodland caribou skin, which I had brought from Iowa City. I afterward found that the light Barren Ground caribou skin robes, such as the natives used, were lighter, warmer, and a great deal more convenient" (1989, p. 95).

After a year in the area Russell went by canoe to Herschel Island where he met the whalers and arranged passage for himself to go back to San Francisco. By this time, 1894, the number of whalers located at Herschel Island was numerous. The vessels Balaena, Grampus, Jeanette, Karluk, Mary D. Hume, Narwhal, and Newport are known to have been in the western Canadian Arctic during the years 1893-1894, for example, and in the following year 15 vessels wintered at Herschel Island (Bockstoce, pp. 42, 114).

To provide for their needs, both food and clothing, the whalers conducted trade with native families who moved nearer to Herschel Island to maintain these trading relationships. Along with natives who already resided in the general area, the whalers brought Chukchee (Siberian) and Eskimo families with them to Herschel Island to prepare clothing and to hunt in order to supply skins and meat. These families signed on when the whaling ships stopped to trade at St. Lawrence Island, Plover Bay, Indian Point, East Cape, the Diomede Islands, Point Hope, or Point Barrow. The natives would then serve in various capacities; being employed as seamstresses was one of the more important occupations.

Photographs of Hartson Bodfish were viewed to determine the types of clothing articles used in the North by whalers. As first mate on the vessel Mary D. Hume early in the decade, he lived with an Eskimo family at their camp in the interior during the winter when whaling was not conducted. During the winter months he wore Inuit clothing and returned to the ship only occasionally. A photograph taken of Bodfish in the summer of 1892 shows him wearing a European-style hat, pants, and shirt that is worn with native footwear. In winter, as Captain of his ship in 1899, a photograph shows a belted, front opening fur jacket and non-native style headgear worn with native mukluks (Bockstoce, pp. 39, 48).

The whalers at the mouth of the Mackenzie River came from many backgrounds, stopped at many ports for trading and taking on provisions, and brought or attracted natives from a number of different regions to congregate at Herschel Island. For this reason, one can conclude that a wide range of clothing styles were in use in the western Arctic. Also, with the surge of activity in Dawson City and the Klondike Gold Rush in progress, not far south of Herschel Island, one can assume that a much wider range of textile and clothing goods made their way into the western Arctic than when the Hudson's Bay Company was the prime importer of goods.

Footwear cases: 1890-1900

American exploration in this decade is represented by Russell, the scientist from the University of Iowa. The footwear cases are:

case 400 moccasins Russell, 1898, p. 23
case 401 moccasins Russell, 1970, p. 27

Footwear case 492, boots, is based on a party that travelled by sail-sledge from Herschel Island to Point Barrow, Alaska. The nationalities of these men could not be established by the researcher (United States. Treasury Department, 1899, p. 88).

A Canadian, Tyrrell (1908, p. 203) was shown wearing moccasins. This is case 246. Three cases from this decade pertain to the Northwest Mounted Police. These are:

case 473 stockings Ottawa. R.C.M.P., Dawson
case 476 stockings Ottawa. R.C.M.P., Whitehorse
case 477 short boots Ottawa. R.C.M.P., Dawson

No footwear artifacts from this decade have been included in the study.

Clothing documentation: 1900-1910

Around 1887 Hislop and Nagle of Edmonton had formed a partnership to compete with the Hudson's Bay Company. In the 1890s they had opened posts in Fort Resolution and Fort Rae and then, by the turn of the century, ten more posts were opened at various locations including Fort Good Hope, Arctic Red River, and Fort McPherson (Cooke and Holland, 1978, p. 257).

It is difficult to judge to what extent these posts, competing with the Hudson's Bay Company posts, influenced the clothing available in the North. There is no evidence that Canadian Governmental agencies supporting northern research switched expeditors. A letter to the geologist J.M. Bell (Ottawa, n.d., J.M. Bell papers), who was headed to work in the area of Great Bear Lake, from George M. Dawson, Director of the Canadian Geological Survey, states:

> I am sending you with a copy of 'Notes on Northern Geology'.... With this I am also sending you a letter of credit for $1200, and I am writing to Mr. Chipman, Commissioner of the Hudson's Bay Co., asking him to furnish

> you with a letter of recommendation to the various posts of the Company, instructing the officers in charge to afford you any facility in their power.

A close study of the scientific expeditions sponsored by large institutions of this decade, such as that led by the geologist Tyrrell who, in 1900, explored the region between Great Slave Lake and Chesterfield Inlet, or the expedition by Preble and others, sponsored by the Bureau of Biological Survey of the United States Department of Agriculture in 1903-04 to do biological reconnaissance in the Mackenzie region, would likely determine the role of the Hislop and Nagle posts in the procurement of clothing supplies in the field.

For insight into clothing practices of ship-based scientific expeditions to the western Arctic, a sampling of the papers of the American geologist Ernst Leffingwell has been utilized. He was Chief Scientist for the Baldwin-Ziegler Expedition of 1901-02 that left from Dundee, Scotland. From 1906-08 he was co-leader of the Anglo-American Polar Expedition with Ejnar Mikkelson; this expedition left from Victoria, British Columbia. The ship was the Duchess of Bedford and had a crew of four and a scientific staff of four. Plans had been made to meet with the explorer Stefansson at the mouth of the Mackenzie River so they could winter together on Banks Island. Outfitting for the Leffingwell party was done with this in mind. However, Leffingwell's ship became frozen in at Flaxman Island, west of their destination, and the men never did get together.

Leffingwell noted (Hanover, n.d., Notes from Sled Trips) that the clothing that he would include on a sled trip would be fur breeches, knee leggings, wool socks, rubber shoes or finnesko,[12] dog skin mittens, a calico snow shirt and a silk snow shirt, canvas fringed gloves, blanket pieces, handkerchiefs, underwear and a belt. Needle and thread would be taken as well.

Leffingwell was well attuned to modifying his own clothing to meet northern environmental conditions, as is demonstrated by the writings in his diary from the Baldwin-Ziegler Expedition. In one instance he went to the carpentry supplies and built himself some wooden shoes, finding that they provided excellent thermal insulation. He sewed his own headgear and "parkies" and he wove dog traces and fixed his gear when necessary. His preference, for cold conditions, was a particularly designed jacket that he describes as follows:

> wgt 7 lbs and long enough for two, can fit arms inside sleeves and warm hands on body and arrange dress with ease and comfort with bare hands. Can almost dress and undress inside of them. With belt on they are very warm; without belt the cold air comes up inside and keeps body cool and ventilated. Wore only a sleeveless undershirt weighing 1 lb. and flannel shirt weighing 1 1/2 lb. underneath. (Leffingwell, Hanover, diary, January 20, 1901)

While some of the men in the party did reserve certain clothing for good, it was not a prime concern for

Leffingwell. On Christmas day he says, "The crew and some of the Explor. put on store clothes and boiled shirts, but I celebrated by washing face twice during the day and combing hair." On New Year's Day (1902) he says, "Up 9:00 and started to celebrate with a new suit of underwear but had to hang them over the stove to get out ice" (the day was spent playing poker).

In the eastern Arctic, leaving from Halifax by ship in 1903, and sent by the Canadian Government to assert Canadian sovereignty over Hudson Bay and the Arctic Islands, as well as to establish police and customs stations (Cooke and Holland, 1978, p. 296), was the geologist Low, who has been previously mentioned. This party had much contact with the Inuit people and traded for deerskins and sealskins (Ottawa, n.d., Low papers) and for sealskin boots (Low, 1906, p. 6).

Photographs taken on the Low expedition of men in winter dress (Ottawa. PA-53567) show a preponderance of fur clothing worn. It is cut in a variety of styles, although the coats are of slipover design in all cases. Pants vary, as well, being knee-length or ankle-length and either left outside of the footwear or tucked into the footwear. On the head are either jacket hoods or toques, the toques being dissimilar to each other in nearly every instance. Summer wear (Ottawa, PA-53580, PA-38265, PA-53582, PA-53596) is predominately of fabric pants, dark-colored turtle-necked sweaters, and knee-high non-native boots with the pants tucked inside. It is likely that some of the men portrayed on the photographs are North West Mounted Police personnel as Low's ship, the Neptune, had as one purpose to leave policemen at Cape Fullerton to patrol the area of northwestern Hudson Bay, which was active with British and American whalers. It is also possible that the similarity of the sweaters may be indicative of clothing issue made available to all personnel on the Canadian Government sponsored expedition.

In the west, also in 1903, a North West Mounted Police detachment went to Herschel Island to exercise jurisdiction over the American whalers. From a report by Snyder (Ottawa, R.C.M.P. Headquarters) an idea of northern N.W.M.P. clothing can be gained.

> The supply of clothing received during the past year has been sufficient. The recent changes of uniform have not affected us to any great extent as comparatively few of the new articles of clothing have been supplied. Those received have been of a good quality and are an improvement on the articles formerly issued. The boots, tan, long and short, being especially suited to our requirements, and so far as can be judged after being in use for one year, are of good workmanship and fairly durable. The long boots would be greatly improved if the strap running up the back were sewn with heavier thread, as they rip out there very quickly and many of the men take the precaution of having them resewn before taking them into use.
>
> The breeches are not as durable as formerly, and the new cut makes them difficult to alter, most of them are too tight around the knee, which makes them not so desirable as formerly for winter use on the trails, as after running for any length of time the interrupted circulation gives pain in the knees, and might be productive of varicose veins.

The winter fur caps are suitable in every way for our purpose.

The under clothing is of good quality, the drawers being generally better fitting than the very large sizes formerly supplied. The felt boots are apparently of good quality, although we have had no opportunity of judging their durability, these, however, will hardly take the place of moccasins for detachment use where every man is practically a dog driver. The moccasins supplied are of good quality and are much more durable than those formerly furnished which may be attributed to better sewing.

The pea-jackets are of poor quality and do not wear well, they are easily torn and become faded and shabby very quickly.

Socks and stockings are of better quality than formerly.

The serges are badly cut, being too narrow in the chest which makes them hard to alter.

The unlined stable trousers are better than formerly supplied.

The lined stable jackets are durable but become dirty long before they are worn out, the brown duck clothing having a tendency to become greasy whenever there is fraction and gets shabby in a very short time.

The lined stable trousers are of better cut than formerly, but the sewing is too light for the heavy material and they rip easily.

The prairie hats on hand are of poor quality, become shabby after a few months of wear and rarely survive one season. None of the hats in the store are likely to be issued as the sizes are too large. The genuine Stetson hats would easily out-last three, if not more of these.

The sweater as an article of kit was especially useful in the Yukon being well adapted to all kinds of outdoor labour during the winter as it allowed the free use of the arms in chipping, or running with dogs, it was also a great protection against sudden chills. The discontinuance of this issue is a great loss especially to men employed at outside work in the winter.

A photograph taken of personnel at Fullerton 1903-04 (Ottawa. R.C.M.P. Headquarters) shows all of the men similarly dressed in hooded fur parkas, with one exception.

This is a man who appears to be Inuit wearing a white duffle cloth parka.

A major thrust in this decade was the push to the North Pole. Three major expeditions seeking to reach the Pole were considered in the study of clothing used in this decade; each was basically American in origin and was privately funded.

To indicate the clothing practices of a large privately funded excursion, the Anthony Fiala expedition was studied. Although the ship embarked from Norway and did not cross Canada in its attempt to reach the Pole, the funding, planning of supplies, and all of the crew members came from the United States.

As the following indicates, some clothing and sleeping gear were made from surplus materials left after a previous expedition; other supplies, of course, were purchased.

> A French-Canadian... who had acted as guide... for Mr. Ziegler in many hunting and camping trips, and who accompanied Mr. Champ on the Relief Expedition in 1902, had been left aboard the America as a watchman during the winter. I had written him to use all the heavy furs aboard, left from the previous expedition, in the manufacture of one-man sleeping bags and had also instructed him to make mittens and footwear of fur. I was glad to find that he had improved with time and could show me twenty-five complete bags in addition to a number of articles of wearing apparel. Furs suitable for clothing could not be purchased in Norway or Sweden. All the garments offered to me by the fur merchants of these countries were too heavy, being made of the fur of the adult wild deer, useless for the purpose of a sledge expedition on account

> of its weight, the hides being too thick and the fur too long. So I was obliged to order them from Russia and over 800 fawn skins, of from two to five months old deer, of the domesticated variety were purchased. I had to be content with skins tanned in the regular commercial way, very beautiful to look upon, but not as durable by half as the skins tanned by the native Samoyede. To have secured the latter it would have been necessary for me to make a journey along the Siberian coast for the purpose of trading with the Samoyedes, and for that there was not time. Fortunately, through Mr. Bruno Paetz, the British procounsul at Archangel, I was enabled to secure a number of Samoyede coats made of the skins desired. (Fiala, 1906, p. 17)

Basically, the crew had all of their clothing needs provided; Fiala writes:

> Clothing has been provided for the use of the members after August 1st, 1903, but it is advised that each man provide himself with two flannel Army shirts, two pairs of heavy shoes of larger size than usually worn, three suits of medium weight underwear, a supply of socks and handkerchiefs, and several suits of old clothing, and a small sewing and darning outfit. (Fiala, 1906, p. 18)

Fiala (1906, pp. 222-224) provides a partial list of the clothing furnished to each member of the expedition. Each article of footwear has been assigned a case number and can be found in the next section; the clothing is as follows: a vodmal[13] suit consisting of coat and trousers, a sheepskin jacket, two suits of medium weight underwear, two suits of Jaeger heavy weight underwear, two pairs of Jaeger heavy knitted drawers, two Jaeger sweaters, one Jaeger woollen vest, one pair of horsehide mitts, two pairs of fleece lined Jaeger mitts, one woollen Jaeger comforter, one woollen Jaeger hat, one camel's hair

Jaeger cap, one pair of police suspenders, a web belt and knife, one suit of overalls, two grey woollen shirts, two large camel's hair Jaeger blankets, and a sleeping bag. He notes that additional clothing was furnished to each man according to his needs. In addition, fur clothing or fur sufficient to make a coat, shirt, trousers, and stockings was issued to each man along with silk trousers and wind coats, or the materials to make these items. Materials such as cotton canvas, wool cloth ("closely woven like the winter khaki furnished the U.S. Army") and "Pongee silk for manufacture into clothing should be taken along." The ship was equipped with sewing machines for the men to use.

Particular emphasis was placed by Fiala on the care of the feet. Prior to the departure of a sledge party north from Camp "Abruzzi" in February of 1904 (Fiala, 1906, pp. 76-77) gave a list of instructions:

> 7. To take care of the feet is of the utmost importance. Wear a pair of wool socks that can be changed when dirty and one or two pair of long Jaeger stockings over them. Take off the outside stocking and put it in the sleeping bag at night to dry and put your feet in sleeping socks. Sleeping socks should not be bound tightly; they should have room to move in shoe or boots.
>
> 8. Snow should be brushed from felt boots and the boots put under or in sleeping bag at night to dry out; one on each side of the head would be advised.
>
> 10. When fur boots or moccasins are worn with senne grass, take the grass out at night, pulling it apart and spreading it to allow moisture to

> escape and solidify. The frost crystals can be shaken out in the morning.
>
> 14. It is advised in the matter of clothing to wear just as little as possible while working, so that perspiration will not be induced; if too warm take off coat and simply travel in shirt and wind coat. A man cannot keep warm in damp clothing no matter how much he puts on, and skins are easily ruined when they become wet. Be particular and keep your skin coat dry to keep you warm at halts.

By contrast to this Polar expedition which provisioned for total clothing needs, are the Polar expeditions in this decade by Robert E. Peary and Frederick A. Cook.

Leaving from Glouster, Massachusetts in 1907, F.A. Cook went on a privately funded search for the North Pole. Inuit from Annotok accompanied him north and he dressed and ate as they did while travelling together. He says:

> Our shirts were made of bird skins. Over these were coats of blue fox or caribou skins; our trousers were of bear, our boots of seal, and our stockings of hare skins. This was the usual native winter costume, but under it I had added a suit of underwear. (Cook, 1913, p. 103)

For the final part of the trip to the Pole, Cook cut his party down to two Inuit men, 26 dogs and two sleds, and simplified clothing, as well. They wore the clothing listed above, along with snow goggles and "a band of fox tails under the knee and about the waist." No other author mentioned this use of fox tails and the researcher is unclear as to their exact purpose.

In addition to what was worn, personal bags of extra apparel were taken. The bags included: "four extra pair of kamiks (boots), with fur stockings, a woollen shirt, three pairs of fur mittens, a piece of blanket, a sealskin coat, extra fox tails and dog harness, a repair kit for mending clothing, and much other necessary material" (Cook, 1913, pp. 198-199).

Although the Canadian Government had sent a ship captained by Captain Joseph-Elzéar Bernier to Etah, Greenland, with supplies for Cook, it is likely that the Royal Greenland Trading Company (Cook, 1913, p. ix) also was a supplier of goods. It is the Inuit people of Annotok that were the prime suppliers of raw materials and manufactured clothing, however.

> Many many journeys were taken to secure an important supply of grass to pack boots and mittens.... Each local group of natives was to perform some important duty, suited to its available resources, in gathering the tremendous amount of material required for our trip.... Thus, in one way or another, every man and woman and most of the children of this tribe of two hundred and fifty people were kept busy in the service of this expedition.... The women of the tribe... to them fell the task of assisting in drying fur skins... making our clothing. Throughout the entire days they sat in their snow and store houses, masses of ill-smelling furs before them, cutting the skins, and sewing them into serviceable garments. (Cook, pp. 84-85, 90-91)

The expedition led by Peary that left New York in 1908, obtained its clothing in much the same manner. They stopped at Cape York, Greenland, to pick up 39 Eskimo helpers to go on shipboard with them. Matthew A. Henson, who was Peary's main assistant writes:

> Many and many a time, for periods covering more than twelve months, I have been to all intents an Esquimo, with Esquimos for companions, speaking their language, dressing in the same kind of clothes. (Henson, 1969, pp. 6-7)

Clothing brought by the crew from home was worn in the summer.

The clothing for the trek to the Pole was made on board the ship by native women while the ship was in winter quarters at Cape Sheridan, on northeastern Ellesmere Island. Henson's clothing was made by "Miss 'Bill' who domiciled herself aboard the ship and did much good work with her needle. She was my seamstress and the thick fur clothes worn on the trip to the Pole were sewn by her" (Henson, 1969, p. 49). However, there was a certain strategy followed in packing for the Pole. He writes:

> Our heavy furs that had been made by the Esquimo women on board the ship had been thoroughly aired and carefully packed on the sledges. We were to discard our old clothes before leaving the land and endeavour to be in the cleanest condition possible while contending with the ice, for we know that we would get dirty enough without having the discomfort of vermin added. It is easy to become vermin-infested, and when all forms of life but men and dog seem to have disappeared, the bed bug remains. (Henson, 1969, p. 62)

Footwear cases: 1900-1910

Although the Fiala group left from Norway to travel to non-Canadian Polar regions, it is included because it offers much insight into the expediting practices of well funded expeditions. Fiala (1906) demonstrates the variety of footwear in use in this decade. Those cases taken from written sources are:

case 349 fur footwear, p. 17
case 350 heavy shoes, p. 18
case 351 gators, p. 18
case 352 sleeping socks, p. 60
case 353 ski boots, p. 68
case 354 Jaeger socks, p. 68
case 355 long stockings, p. 68
case 356 seal boots, p. 68
case 357 moccasins, p. 68
case 358 socks, p. 68
case 359 fur boots, p. 68
case 360 wool socks, p. 76
case 361 Jaeger stockings, p. 76
case 362 sleeping socks, p. 76
case 363 felt boots, p. 76
case 364 fur boots, p. 76
case 365 moccasins, p. 76
case 366 senna grass, p. 76
case 367 boots, p. 76-77
case 368 fur stockings, p. 218
case 369 Lapp shoe, p. 218
case 370 native sealskin shoe
case 371 felt boots, p. 218
case 376 sea boots, p. 94
case 380 senna grass, p. 218
case 381 medium weight socks, p. 222
case 382 Jaeger heavy weight socks, p. 222
case 383 woollen long wads, p. 222
case 384 woollen German stockings, p. 222
case 385 long Jaeger stockings, p. 222
case 386 felt boots, p. 223
case 387 Jaeger felt slippers, p. 223
case 388 buckskin moccasins, p. 223
case 389 sea boots, p. 223
case 390 Samoyede boots, p. 223
case 391 rubber boots, p. 223
case 392 fur stockings, p. 223
case 393 goatshair sleeping socks, p. 223
case 394 long hunting socks, p. 223
case 395 shoes, p. 223
case 396 Finn schu, p. 223
case 397 Esquimaux winter boots, p. 223
case 398 Norwegian "komager," p. 223

Photographs and drawings published by Fiala (1906) provide the following data cases:

case 372 Lapp boots, pp. 78-79
case 373 Lapp boots, pp. 78-79
case 374 boots, pp. 78-79
case 375 moccasins, p. 78-79
case 377 boots, pp. 150-151
case 378 stockings, pp. 178-179
case 379 unrecognizable, pp. 178-179

The expedition party led by Dr. Frederick Cook (1913) yielded a number of cases. Although native footwear was often mentioned, to assign a case number each time would have been repetitious. The cases that have been recorded come from both written and visual sources. They are:

case 128 grass shoe padding, p. 84
case 129 fox and hareskin stockings, p. 85
case 130 mukluk-sandal boot, photo, p. 12
case 131 boots
case 132 stockings
case 133 kamiks, pp. 198-199
case 134 fur stuffed boots, p. 238
case 135 fur stockings, p. 275
case 136 kamiks, photo, p. 332

From the Peary expedition to the Pole in this decade, these written sources come from Henson (1969):

case 312 kamiks
case 313 kamiks
case 314 kamiks

A photograph published in Henson's A Black Explorer at the North Pole. An Autobiographical Report by the Negro Who Conquered the Top of the World provided cases 308, 309, 310, and 311; in each case kamiks are being worn.

The Daily Graphic (1909, p. 5) pictures Peary wearing what is called mukluk-sandal boots, based upon the classification scheme used by Hatt (1967). These are recorded as case 26.

The expedition by Peary and Donald B. MacMillan is also represented by visual documents housed at the Peary-MacMillan Arctic Museum. The cases recorded are:

case 58 unrecognizable, blown up photo on display
case 60 mukluk-sandal boot, photo mural on display
case 61 moccasin-boot, Buechner drawing

Sealskin boots, worn by MacMillan, are on display at this museum, although it was impossible to examine them closely for detail. They constitute case 59.

The footwear utilized by scientists in this decade is represented by an American working in the western Arctic and a Canadian working in the eastern Arctic. The following footwear was mentioned by Ernst Leffingwell in unpublished papers held at Dartmouth College, Hanover, New Hampshire:

case 74 moccasins, Journal, October 30, 1901
case 75 wooden shoes, Journal, October 29, 1901
case 76 knee leggings, Notes of Sled Trips
case 77 wool socks, Notes of Sled Trips
case 78 finnesko, Notes of Sled Trips
case 79 long stockings, Notes of Sled Trips
case 80 "sen negroes"(?), diary, 1902
case 81 rubber shoes, Notes of Sled Trips
case 399 rubber shoes, Notes of Sled Trips

The Canadian geologist Low mentions in the text of his book Cruise of the Neptune (1906, p. 6) the use of sealskin boots. This constitutes case 348. The other footwear cases have been taken from photographs housed at the Public Archives of Canada, in Ottawa. These are:

case 427 boots, PA-53582
case 428 boots, PA-53567
case 429 boots, PA-38265
case 430 boots, PA-53580
case 431 boots, PA-53596
case 432 mukluks, C-24520
case 433 shoes, C-24520

Another group working in the Canadian Arctic during this decade is the North West Mounted Police. All of the materials under consideration are housed at the R.C.M.P. Headquarters in Ottawa. The following cases are from the N.W.M.P. Official Kit list from 1909:

case 462 moccasins
case 463 socks
case 464 stockings
case 465 long boots
case 466 short boots

These next cases are from written data taken from the 1902 Snyder Report:

case 467 felt boots
case 468 long boots
case 469 socks
case 470 stockings

These data have been derived from photographs:

case 471 moccasins, Whitehorse, 1900
case 472 short boots, Whitehorse, 1900
case 474 mukluks, Fullerton, 1903

The MacMillan boots, mentioned previously as case 59, are the only footwear artifacts from this decade that have been recorded in the study.

Clothing documentation: 1910-1920

The numbers of people involved in exploration of the Canadian North increased at a rapid pace from 1910-1920; there were anthropological, geological, and zoological expeditions seeking scientific information. An expedition that attempted to do all of these types of work was the Canadian Arctic Expedition that lasted from 1913 through 1918. The expedition was headed by Vilhjalmur Stefansson, who was of Icelandic descent but grew up in the United States. Because of its size, the importance, the number of years which the expedition lasted, and the fact that the men came from a variety of backgrounds and a number of institutions, it alone is used to represent clothing practices in the North in this decade.

Exploration of the western Arctic was done by two groups: a southern division and a northern division. The southern group, led by the zoologist Robert Anderson, surveyed the coastal area from Alaska eastward to Coronation Gulf; the northern group focused its attention on the unknown islands of the Canadian archipelago. A third group was involuntarily separated from the main parties before research had even begun due to ice conditions which caused their ship, the Karluk, to float to Wrangle Island, now a part of Siberia. Because of Stefansson's apparent lack of concern for these men, the expedition as a whole aroused much controversy and unpublished, as well as published, papers offer differing points of view on preparations and management of this large Canadian expedition.

Stefansson has published extensively (Mattila, 1978) on northern exploration, provisioning the arctic explorer, and how to live off the land. Because it is clear that his preference was for native-styled clothing, the researcher feels it unnecessary to specify the items of clothing worn by Stefansson except to state that his clothing was generally designed and made by native women. Suffice it to say that Stefansson's first choice while working in the Canadian Arctic was always native clothing.

Consequently, discussion emphasizes non-native textile tools, materials, and clothing purchased specifically for this expedition. It is felt that a sampling of the numerous papers pertaining to the ordering of supplies for this major Canadian expedition provides an indication of the clothing and textile goods available for any reasonably well funded group in this decade.

It must be borne in mind that many textiles were taken to the North for non-clothing purposes. Ship sails, canvas boats, tents, and sleeping bags, and towels are prime examples and have been previously mentioned. These goods are important in a documentation of clothing, however, because very often they ended up being used as materials for clothing constructed by the men while on shipboard or in the field.

The Anderson papers held in the Public Archives of Canada were used to provide information on expediting of the Canadian Arctic Expedition. A number of textile tools and products were purchased specifically for use in scientific field research (Ottawa, Anderson Papers 3(1)6, Vol. 20). For example, for his research, Fritz Johnson ordered cotton twine, netting, gilling nets, ropes, and twine. These were purchased from the Linen Thread Company, an agent of W.J. Hooper Manufacturing Company. The taxidermist in the group purchased a sewing palm and curved needles (1-12) from Frank Block Webster Co. of Hyde Park, Massachusetts. From Duncan & Sons of Seattle, 400 yards of web, straight awls, curved awls, straight harness needles and harness thread were purchased. These goods were shipped by the Pacific Coast Steam Company to Nome (Ottawa, Anderson Papers, Files 1-11, Vol. 20). The Smart-Woods Company, of Ottawa, confirmed an order for 1000 yards of 29 inch white cotton drill, 12 yards of white mosquito netting, provision bags and waterproof bags in various sizes, two bolts of cheese cloth, 100 yards of 72 inch fine mesh netting, called English bobbinet, and five bolts of bed ticking. The Douglas-Milligan Ltd. Company of Montreal confirmed an order for 50 gallons of a waterproofing material for canvas. A confirmation of an order by the Department of Naval Service, Ottawa (May 7, 1913), mentions 8 oz. olive green denim and implies a purchase of over 1000 yards. From S. & H. Borbridge of Ottawa a variety of moccasins, felt slippers, and greases for moccasins were obtained; these will be listed in the next section. The company also suppled one pound of No. 15 hemp thread, a package of needles, one dozen No. 3 awls, six awl handles, and 12 No. 7 pack sacks. It appears that the order came from the Wholesale and Retail Saddlers

Branch of Brandon, Manitoba. The Burburry Company, a large firm with offices in London, Paris, New York, and Buenos Aires, assembled and sold clothing kits for specialized needs. For example, they offered a "weather proof kit" of specially prepared fabrics. Expedition leaders wrote (March 20, 1913) to obtain an estimate for a "Burburry outfit;" this was to include: ten gabardine suits, ten fleece suits, two double tents (complete with ground sheets), 300 yards of gabardine, 100 yards of fleece, 12 pairs of skiing mitts and six lumber coats. The researcher was unable to establish whether or not the "Burburry outfit" was actually purchased.

The greatest quantity of clothing for the expedition was obtained from Jaeger's Sanitary Woollen System Co. of Montreal. On the estimate received from this company (March 19, 1913) are men's vests, men's pants D.F., men's pyjama suits, mitts, gloves, caps, sweaters, blankets, and fleece yardage, plus a quantity of various types of footwear (listed in the following section). The goods from Jaeger's were to be "sent from Montreal to Esquimault by freight service unless timely instructions are received from Mr. Stefansson by the Jaeger Company." In addition to these textile items, Order Number 837 of April 17, 1913, listed men's sweaters, bedsocks, thick sock felt, and 72 inch wide fleece material.

It is not clear how supplies were divided between the three ships sailing north for Herschel Island. This is important since the ship Karluk was isolated from the others. The ship rounded Cape Hope, Alaska, on July 31 and then, in August, became trapped as the water closed over with ice. Therefore, the men only had access to the provisions stored on the Karluk and it seems that the bulk of the supplies they needed for overland travel were unavailable. The plight of the men illustrates, in part, the differing clothing and textile supplies needed for a ship-based party compared to that of one travelling on foot.

In January, 1914, the ship began to disintegrate in the ice and the men were faced with preparation for ship abandonment and setting out on foot. Much detail comes from the diary of William McKinlay (Ottawa, Anderson Papers, McKinlay diary). It is clear that clothing materials were in extremely short supply. McKinlay writes:

> Saturday Jan. 3rd. Today Beuchat, Murray and MacKay received sleeping bags from the Captain. Some others, including myself, received a few skins with which to make a new skin shirt to replace the second-hand articles we at present possess. (p. 32)
>
> Saturday Jan. 10th. I was busy all day putting the finishing touches to a pair of sheepskin socks and a pair of deerskin mitts. (p. 34)
>
> Wednesday Jan. 14th. There was very little to be done outside today, the Captain being anxious that everyone should get his clothing into good order as soon as possible. Consequently, we have been sewing almost all day. As there are only six sleeping bags, and not sufficient skins to make others, Captain has decided that everyone should make simply a small bag which will cover the feet, reaching to the

> knees. Another consideration which led to this decision was the fact that sleeping bags would impose too much weight on the trail. (p. 36)
>
> Mon. Jan. 19th. Preparations have now been completed for the departure. We have cut up the sleeping bag I have been using, and it makes a splendid rig on which the party can sleep while on the trail.... I undertook to be the night-watchman... as Mallock has not yet all his clothing in order. (p. 38)

On January 22, McKinlay noted in his diary the stock that is contained in the store tent. He listed 70 suits of underwear, 30 Jaeger caps, three rolls of Burburry gabardine, six Jaeger sweaters, 200 pairs of Jaeger socks, four Burburry hunting suits, 36 woollen shirts, 100 pairs of Jaeger mitts, six fleece suits, two large sacks of deer legs, two large sacks of skin-boots, 100 fawn skins, two large sealskins, 20 deerskins, 12 sealskins, and six heavy winter skins. McKinlay wrote (diary, pp. 39-40) that they would:

> use as much of the woollen clothing as possible in camp, but we must leave much of it behind, for we will not be able to carry it along, altho' it would make admirable summer wear. We are using as many of the skins as possible, altho' many are useless, thro' being rotten, others being too thin.

The Karluk party, including McKinlay, who was to have served as meteorologist and magnetician for the Canadian Arctic Expedition, had severe problems as they walked across the land seeking rescue. Frost bite, gangrene, amputation, scurvy, and death occurred before the few survivors were located. By necessity, maintaining serviceable footwear was a major preoccupation of the group.

Footwear cases: 1910-1920

A photo of a Mounted Police officer in Baker Lake (Ottawa, R.C.M.P. photograph, 1920) provided case 475. The officer is wearing native clothing including mukluks.

Data cases 198, 199, and 200 represent mukluks housed at the Museum of Anthropology, University of British Columbia, Vancouver. The actual artifacts were not examined by this researcher; only the accession sheets were utilized.

George M. Douglas (1914, pp. 163, 168) provided pictures of Father Rouvière, an Oblate Catholic missionary on the Dease River in the western Arctic. His attire, including footwear, constitutes case 494. In discussing supplies for their own use Douglas (1914, p. 9) mentions moccasins; these are case 493.

With these exceptions, the footwear cases that are utilized in the analysis of footwear usage in this decade are extracted from documentary sources pertaining to Stefansson's Canadian Arctic Expedition and from papers concerned with men on the ship Karluk.

The following cases are from photograph albums of pictures taken on the Stefansson expedition that are housed in the Baker Library, at Dartmouth College, in Hanover, New Hampshire. Many of these have duplicate copies that are part of the collection of photographs of the Geological Survey of Canada and housed in the Public

Archives of Canada. However, all of the photographs listed were viewed in Hanover.

case 62 unrecognizable, Album 4 No. 2
case 63 mukluks, Album 4 No. 11
case 64 mukluks, Album 4 No. 12
case 65 mukluks, C.G.S. 50806
case 86 mukluks, Album 4 No. 15
case 87 mukluks, Album 4 No. 16
case 88 mukluks, Album 4 No. 88
case 89 mukluks, Album 4 No. 92
case 90 mukluks, Album 4 No. 95
case 91 mukluks, Album 4 No. 125
case 92 mukluks, Album 4 Nos. 136 and 137
case 93 mukluk-sandal boots, photo of N.W.M.P.
case 94 unrecognizable, Album 4 No. 249
case 95 mukluks, Album 4 No. 318
case 96 boots, Album 4 N. 350
case 97 boots, Album 4 No. 351
case 98 mukluks, Album 5 No. 13
case 99 mukluks, Album 5 No. 84
case 100 mukluks, Album 5 No. 163

The following cases are taken both from the text and photographs published in the book Karluk by McKinlay (1976).

case 315 mukluks, p. 28
case 316 sheepskin socks, p. 65
case 317 Jaeger socks, p. 69
case 318 skin boots, p. 69
case 319 stockings, p. 83
case 320 stockings, pp. 114-115
case 321 moccasin-boot
case 322 Jaeger's socks, p. 127
case 323 boot packing, p. 127
case 324 moccasin-boot, pp. 130-131
case 325 moccasin-boot, pp. 130-131
case 326 stockings, p. 153

Three photographs have been utilized that pertain to footwear usage by this same group of men. The photographs were viewed at the Photo Archives Division of the Public Archives of Canada in Ottawa.

case 423 unrecognizable, PA-120589
case 434 boot sole, C-71027
case 435 boots, C-86053

While it is not known for sure if all of this footwear was purchased for the personnel on the expedition, the footwear listed on the estimate for supplies for the Canadian Arctic Expedition by Dr. Jaeger's Sanitary Woollen System Co. Ltd., in Montreal, have been included in the study. These are:

case 436 Jaeger ski socks
case 437 Jaeger bed socks
case 438 Jaeger slipper socks
case 439 Jaeger Buxton slippers
case 440 Jaeger felt Wellingtons
case 441 Jaeger light natural socks

Goods listed on the Borbridge invoice, which is included in the Anderson Papers (Ottawa), were purchased and used on the Stefansson expedition. The cases derived from the Borbridge invoice are:

case 442 thick sock felt
case 443 seamless heal moccasins
case 444 oil tan, seamless heel moccasins
case 445 moccasin grease
case 446 grease for oil tan moccasin
case 447 wax ends
case 448 felt slippers, heavy
case 449 felt slippers, light

The following cases pertain to footwear used by men on the Canadian Arctic Expedition that were conducting research. Gumaer's diary, dated June 6, 1916, contains the following references to footwear:

case 402 blanket socks
case 403 water "muck lucks"

An equipment list provided by Storkerson in his diary entry on April 3, 1918, listed the following:

case 405 woollen stockings
case 406 blanquet duffils
case 407 deerskin socks
case 408 sealskin socks
case 409 sealskin wader boots
case 410 moccasins
case 411 woollen stockings
case 412 camp slipper
case 413 deerskin socks
case 414 woollen boots
case 415 insoles
case 416 deerskin socks
case 417 woollen socks
case 418 woollen stockings
case 419 canvas boots
case 420 canvas boots with ugruk soles
case 421 deerleg boots with deerskin soles
case 422 deerskin sox

No surviving footwear artifacts from this decade have been assigned case numbers.

C. The footwear analyses

The footwear analyses were conducted by two separate approaches, that is, by coding information on developed recording sheets so that manipulation of data could be accomplished mechanically and by laboratory study of artifacts to determine design detail.

The computerized study

The SPSS analysis was intended to serve as one tool in the accomplishment of two purposes, that is, 1) to compare the quantity and quality of data that might be recovered from the three types of documentary materials, and 2) to learn as much as possible about the material, cut, and style of the footwear, as time allowed, so that information could be reported on innovation and cultural borrowing between Europeans and native peoples.

The data recording sheet listed 94 variables and it was planned that the researcher would locate "footwear cases" contained in documents of each type and then enter coded data for each variable in response to the information provided by the footwear case alone. It was found that, in most instances, information had to be listed as "missing" for the majority of variables because the case, by itself, did not offer sufficient explicit information, that is, information for which there was no need for the researcher to make inferences. Only in respect to written documentary materials was there the possibility of establishing temporal-geographical context, climatic detail, and expedition detail in relation to clothing and footwear detail. This was true because the researcher had a whole document to work with rather than mere description of the footwear case alone. Thus, data presented by an author in a context other than clothing description were available for utilization by the researcher in establishing clothing assembly usage relative to particular environmental conditions.

With the decision to focus on written documentary sources in the main study, and to utilize them fully, it was no longer credible to make comparisons between the information offered by a whole narrative or written communication with one painting, one photograph, or one footwear artifact fragment. Thus, it became inappropriate to attempt a quantitative comparison of the data derived from the three types of documentary sources. For this reason, after completing the pilot study, the researcher felt that only one of the two stated purposes could be accomplished and it was decided to concentrate on documentation of the clothing assembly rather than focusing on the comparison of the usefulness of the three types of documentary data.

A second reason for not reporting results of the computerized analysis of data, however, is that as data were collected and recorded it slowly became clear to the researcher that coding rules had not remained constant throughout the study. Having field definitions for the data base was not a sufficient guarantee that the coder did not alter, be it unconsciously, the interpretation of events as knowledge of arctic history increased and experience provided a larger number of resources for consultation. Consequently, lower numbered "footwear cases," in all likelihood, have information coded slightly differently than had they been recorded near the end of the study.

While this problem may exist more often than is acknowledged, it is not too surprising in an exploratory study of this nature. Moodie and Catchpole (1975) have outlined in detail the precautions that can be employed to insure against lack of validity and reliability in a historical study that uses coding of historical data as a research technique. With refinements, the approach that was attempted in this study could work successfully in the implementation of a computerized statistical study. One could then derive descriptive statistics, frequency distributions, and associations between variables to document and analyze historic cold weather clothing practices.

This lack of confidence in the results that would be generated in a statistical analysis of the data collected in this study does not negate the fact that the computer and the SPSS program were of enormous help in the organization and manipulation of information on clothing usage by early explorers in the Canadian Arctic. It would have been nearly impossible to manage, in orderly fashion, the thousands of bits of information that were compiled on historic cold weather clothing without the help of the computer.

The data that have been recovered and coded for the 500 footwear cases are contained in Appendix 6.

Design of the footwear artifacts

Utilizing the footwear analysis sheets (see Appendix 3), devised by the researcher for this purpose, artifacts from three collections were documented to gain greater understanding of the material, cut, and style of footwear worn in the North. The information that has been recorded for each artifact has been placed at the institution in which the particular collection is housed.

The first collection studied was from the McClintock Cart Site (see Dempsey, n.d., Calgary). It is housed at the Glenbow-Alberta Institute. The collection contains European-styled clothing and footwear, including high boots, ankle-high shoes, and stockings. All of the outer footwear fits Hald's (1972) saalsko category. Attention focused on constructional detail and proportions of individual pieces of each footwear example.

The high boots and low shoes were found to be very similar in design to the sea boots and Blucher boots described by Sidwell (1917) in his discussion of "Military and Naval Footwear." The sea boots were not examined in detail, as they were on public display. The Blucher boots have the vamp and tongue cut as one piece and quarters are present, with the counter being positioned over a portion of each quarter. There is no back seam and the vamp wing is stitched to the quarter with two rows and stitching. Two tie-holes are located in each quarter through which a lace is passed to hold the shoe on the foot. The soles are square-toed and are cut as straights. Heels are built up of layers of leather and are wooden pegged.

Fragmentary examples of probable leather soled canvas shoes were also examined. Only the soles remained so that height could not be determined. The canvas remnants are inserted between heel lifts and can be seen when the heel is viewed in cross section; heels are stitched and nailed. The nails, which are square in shape, are not attracted to a magnet and can be judged to be non-ferrous. It is likely that they are a copper alloy due to the blue-green color that is visible.

The other type of footwear represented in the collection is the thigh-high knitted wool stockings. Footed stockings have been created by sewing blanket cloth, using overcast stitching, for attaching fabric "soles" to the stockings.

The second collection considered is housed in the Anthropology Department, University of Alberta. These leather fragments, located from Inuit sites on Banks Island (see Hickey, 1979), were analyzed so that one might establish whether or not the artifacts were derived from British-made footwear.

The largest of these artifact fragments was identified as soles. This was determined on the basis of shape; they are square-toed and cut as straights. Other artifact fragments that were recognizable as footwear pieces include rands (the piece placed between heel and sole), welts (the piece placed between upper and sole), fragments of quarters, and heels. Heels are wooden pegged. Some fragments indicate square heels which may have once contained the same square nails present in shoes held in the McClintock collection.

Analysis of the artifact fragments was based upon stitch length, the shape of stitch holes, fiber identifications, and the twist and ply of the few threads that remain in the stitch holes. Evidence of the tunnel stitch was noted on several artifacts and it was important in the process of description to distinguish between flesh side and grain side of the leather fragments. It was concluded that the artifacts were, indeed, of British origin.

The third collection of artifacts that was studied was the Athapaskan Indian footwear collected from a variety of sources by the Provincial Museum of Alberta. Some of the pieces pre-date 1920 and were useful for establishing the material, cut, and style of native-made footwear obtained in western Canada for use by expedition personnel.

Generally, the footwear is constructed of smoke-cured moose hide that has had the grain removed in the course of processing. Seams are sewn either with sinew or commercially prepared thread; most often the sewing is done with the overcast stitch. The cut of the footwear is what Hatt (1969) calls the moccasin boot. Most fall into Hatt's (1976) classification scheme for North American moccasins as Series 6, that is, they are made of more than one piece and have a T-shaped heel seam and a straight toe seam. Also common, but less frequent, are those that fit Hatt's Series 10 category. These are of more than one piece and have a T-shaped heel seam but have no toe seam. The footwear is held on the foot by a tie that goes through slits in the lower piece and the vamp, then wrapping and tying around the calf of the leg.

When the native-made footwear is decorated, a floral motif is most common. This is done directly on the vamp and one or more rows of a core yarn (often a bundle of horse hairs) has been wrapped, either by silk or silk-like thread or by dyed horse hair, and attached to the footwear over the vamp seam. The floral design has been created by 1) embroidering with dyed threads using the button hole or false satin stitch, 2) using dyed quills attached with the spot stitch, or 3) adding colored glass, and occasionally, metal beads using the overlaid stitch.

Examination of each of these artifact collections has been of great value in evaluating the written records that mention footwear usage by particular expeditions. Study of actual footwear artifacts has proven to be mandatory for establishing the material, cut, and style found in arctic footwear for the information was not often obtained from the other types of documentary sources.

V. Conclusions

A. Location of written documentary sources

The process of locating written materials pertinent to a study of historical cold weather clothing has led the researcher to conclude that manual bibliographic searches prove more effective than computerized searches when the subject matter is not a common topic of inquiry.

Present day studies of textile technology and physiological aspects of clothing were easily located by mechanical means since titles and key words chosen by author or indexers served well to describe the contents of the publication. However, mechanical searches were unsuccessful in locating useful materials on historic clothing design, procurement, and usage in the Canadian Arctic. It was concluded that the reason for this was that few indexes are organized so as to incorporate sources relevant to historic protective clothing.

The most useful information was found in unpublished archival collections. The reason for this is that in the process of synthesis, a necessary process for the creation of a coherent publication, data must be consolidated, edited, and polished. Too often, information relating clothing usage and environmental factors was condensed to the point that little could be learned from the data that was relevant to this particular study. Archival collections provided the most complete data relating clothing and environment. Locating useful information was extremely slow, however, except when finding aids (ideally which included complete registers and name indexes with biographical data sufficient to locate activities in time and space) were available. Accessibility of primary data sources was found to be prerequisite for a study of historical clothing.

Of published materials, the most useful were first-person narratives. Of the available secondary published sources, the most useful were found to be those that dealt specifically with surviving clothing artifacts, such as published archaeological site reports. This is because the purpose of the clothing description is for artifact analysis and comparison. Published reports of surviving clothing and footwear artifacts, as described by archaeologists, were useful because the historic garments were commonly placed in a spacial/temporal framework. As a result, variation in attributes could be used effectively to aid in the understanding of human behavior. Thus, variation in typology could be understood within the cultural context of the manufacturer or user. This type of analysis is necessary before the importance of innovation and cultural borrowing can begin to be established.

Because accession sheets for institutional collections were found to provide little detail, artifact collections were a source of important information only when it was possible to study the actual artifacts. Access to collections for research purposes was found to vary significantly from one institution to another; the fact that a historic clothing artifact survives does not mean that quantities of data will necessarily be derived. In many instances the condition of the artifact limits the handling that would be necessary for detailed analyses. For this reason, the location and evaluation of written accession sheets, and especially the condition reports of pertinent artifacts, is especially important. Only in this way can the researcher determine which historic clothing artifacts are potentially available for examination.

B. Relative value of written, visual, and artifact data sources

It was concluded from the sources examined, that written documentary data most often provided information on the name of a particular clothing fashion and the materials from which it had been constructed. Generally, however, written sources provided little information on the cut, constructional detail, and ornamentation of footwear or clothing. However, they were the only type of data that provided any information on number of layers being worn and, thus, the necessary information to estimate the amount of thermal insulation provided by the clothing assembly. Written sources were also the only type of documents which defined clothing usage relative to the time of day, exact date, and precise latitude and longitude at which the ensemble was being worn.

Visual data, by contrast, only gave concrete data on differences in outline and shape of the outer garments. Visual clues about the materials from which the outer garment was constructed were discernible in some instances and were useful in establishing outerwear detail. With visual data the name of the garment was not provided by the wearer except when, in rare instances, he, or someone later in time, added a descriptive caption to the drawing, engraving, painting, or photograph. Thus, when using visual data to document outer garments being worn it was necessary to categorize clothing on the basis of its material and cut; a garment for the upper trunk thus might be "cloth-no hood-slipover-knee length," "skin-hooded-front opening-hip length," "cloth-hooded-slipover-waist length," or any number of combinations.

Commonly, clothing detail provided by visual documents was found to be unreliable since the artistic rendition of the clothing assembly was modified to create a pleasing visual effect. Visual documentation, used in conjunction with written records, greatly supplemented information on clothing materials and design. Since the collections that were examined were so fragmentary, it proved difficult to relate the isolated details that were learned by study of the artifacts to the total historic clothing assembly.

The researcher concluded that each type of documentary source, i.e. written, visual, and artifact, offered both strengths and weaknesses. Even when all documentary types were considered, gaps in information made it impossible, in most cases, to establish the clo factor of historic cold weather clothing assemblies. Written materials gave the most data on clothing usage in terms of climate and temporal-geographical context. Written and visual documents used together were necessary to establish the total clothing assembly. Only by the study of artifacts was it possible to secure sufficient detail to establish the design, materials and construction techniques of historic clothing and footwear.

C. Clothing practices

Clothing usage through time and space

One can hypothesize that the initial contacts North American natives had with European clothing practices were with the Norse settlements on coastal shores of Newfoundland. In these settlements woven woollen clothing was almost certainly produced and it is likely that footwear of the hudsko type was made of untanned hide.

With the coming of the British explorers to the North in the 15th and 16th centuries evidence indicates that native people already had experience in trading clothing articles for European trade goods. The British were fascinated by the native people that they encountered and a group was taken back to England and placed on exhibition; descriptions of native appearance and clothing styles were circulated about Europe at this time. By the mid-18th century clothing utilization descriptions were sufficiently detailed so as to distinguish clothing designs of different North American native groups. There can be no doubt that European explorers were aware of dressing for the North American environment.

Fifteenth century British exploration of North America was a calculated effort to find new sources of wealth to bolster an economy that was sluggish due to a collapsing wool trade. The East India Company, for example, formed to organize the silk and spice trade so that it would be ready for business when an economical route could be found to the Orient. Expeditions, such as the large Frobisher party, were sent out to seek a North West Passage and to locate and exploit mining sites by establishing a mining colony (O.P. Dickason, personal communication). Creating an English image was secondary. One can conclude that dress standards at this time were not of particular importance.

Land-based exploration parties of the late 18th and early 19th century depended upon clothing assemblies that were partially or totally native-made and were obtained directly from the craftsperson or through trading establishments. Native-style clothing items were often available for purchase through Hudson's Bay Company posts. Evidence suggests that these items were crafted by native women who had ties, often through marriage, with the local traders. The Company traders were often not Englishmen but, rather, were men who had left Scotland or the Orkneys to join the Hudson's Bay Company as it offered new opportunities and adventures. Coming from a rugged background that made the frontier environmental conditions not totally unique, they modified their clothing assemblies whenever necessary to adapt to local conditions. A blend of native and non-native elements in the clothing assemblies was the result.

After 1760 Hudson's Bay Company supply ships began coming to Canada on a regular basis. It is after 1815, however, that emphasis by the British Admiralty and career oriented naval men focused on Canadian arctic exploration. Data, collected in this study, indicated that naval officers wore uniforms most of the time while on these early expeditions, while crew members wore non-regulation clothing. Crew members were given one set of cold weather clothing as a gift from the government. To supplement this they had access to ship slopchests to purchase their clothing needs. In the early decades of the 19th century the officers and crew members were expected to obtain clothing for overland excursions and sledging (or were at least not discouraged from obtaining) supplementary suitable clothing through trade with native groups.

Expeditions from England purposely sought a portion of their clothing needs from settlements on the coast of Greenland and, then, to get replacement items when necessary from natives residing in the general locale of the expedition winter headquarters. Though trade for clothing was mentioned in these decades, the writings by personnel on expeditions sponsored by the British Admiralty mentioned the use of this clothing only when extreme necessity demanded its use. Clothing usage, as communicated to the Admiralty (detailed daily written reports by expedition leaders were mandatory), indicates the use of European woollens, with standardized design for officers and non-standardized trousers, jackets, and footwear for crew members. Illustrations from this period suggest that the footwear of the British ship crew members represents both the lace and eyelet style of the English working class and the hide pampooties reminiscent of old Norse footwear.

As was true of many employees of the Hudson's Bay Company, a large number of ship crew members came from the Orkney Islands and the Hebrides. They were picked up from their homes after the ships left English ports. It is unlikely that the heritage of these men was English since these islands were Norse until the 13th century and did not become Scottish until the 15th century. Nor was Scotland particularly English when the early 19th century expeditions occurred; it was ruled by hereditary clans until the 18th century when England and Scotland were united. That crew members' footwear reflects Viking materials and design is no surprise.

It is around 1850, after the disappearance of Sir John Franklin, that rigid dress standards appear to be enforced, either implicitly or explicitly. One can not doubt that the British were truly interested in finding Franklin. Yet, one can also speculate that the sending of many expeditions to the Arctic, all with large fully supplied ships stocked with enough clothing and textiles to last the duration of the trip, was a public means of displaying British prosperity. Britain was a prosperous country from 1850 through 1870. These decades were also strongly Victorian, that is, much value was placed upon duty, hard work, strong character, and responsible behavior at all times. Clothing attitude of the time strongly reflected these Victorian virtues, and the reluctance of British Naval men to deviate from clothing forms dictated by the Admiralty offices in London, confirms the fact that duty and responsibility to maintain accepted dress codes at times outweighed comfort when clothing assemblies were devised for northern exploration.

By 1870 the strong British economy was weakening and the number of British expeditions to North America was declining as well. The Nares expedition was the last of the flamboyant, well publicized expeditions to the Canadian Arctic. Though the group failed to reach the North Pole, and many men suffered greatly due to health problems, the quantity of clothing and textiles was never a problem. When the ship returned to England at the end of the voyage, the large stock of unused clothing attests to the fact that Admiralty sponsored expeditions were abundantly supplied.

Except for formal dress of officers of the British Royal Navy, dress for the North by Americans before 1850 is similar to that of the English. Most expeditions would have originated from New England and at this time, of course, the population was mostly Anglo-Saxon/Protestant. One expects that American whaler's dress was nearly identical to clothing used by British whalers. Even in the Arctic, dress did not reflect class differences on American expeditions to the extent that it did on British expeditions. One must appreciate the fact that there were fundamental philosophical differences between the British and Americans; social attitudes differed in the 18th century. American leaders had various definitions of democracy, personal liberty, and equal opportunity, and immigration from Britain to the Colonies had generally resulted from opposition to policies inherent in the British system.

The British Royal Navy ships of the 18th century commonly formed their crews by impressment, operating in the Scottish islands and in colonial America before the Revolutionary War. Although, during the war the American Continental Navy was also guilty of this practice (Copeland, 1977), no evidence was located that suggested that Americans impressed crews for service in the Arctic. American exploratory expeditions to the North were small and appear to have been outfitted in simple fashion. In the early decades the American explorer was generally supplied entirely by private individuals rather than by governmental decree and participation was largely because of personal interest in the venture. No instances were found where all protective clothing for an expedition was provided to the men with American government funding.

After the Civil War, American society was equalitarian in principle, although there was a growing class of wealthy individuals. Private funding was, therefore, available for the support of American arctic exploration at a time when the British economy encouraged a de-emphasis of Crown-supported expedition travel. In addition, the cost of outfitting the typically smaller and simpler American expedition was a fraction of the cost required by the British Admiralty. The simplicity of clothing and other subsistance supplies no doubt reflected participant philosophy and not a government ordered policy. Use of native clothing, a common but not exclusive practice of

American arctic explorers, was by choice and encouraged by the fact that the American government did not finance large expansionist ventures at this time. It was the personal responsibility of the individual or the group leader to obtain suitable protective clothing for the expedition members. Even in cases where the government of the United States attempted outfitting an arctic expedition in regulation military wear (such as the 1882 Greely expedition), combination assemblies of native and non-native clothing were considered to be best. Thus, through the decades, clothing procurement policy encouraged expedition members to be resourceful and flexible in obtaining and adapting clothing supply to specific conditions.

Clothing usage by Canadians is difficult to define since Canada originated as, and has continued to be, a culturally diverse society. Eighteenth century residents included Eskimo, Indian, French, British, and Metis. The term "Canadians" varied over the years in its meaning. In the 16th century it referred to the people of the North Shore (Montagnais and Naskapi). After the establishment of New France the term was applied to inhabitants of the St. Lawrence region. Then, after the Act of Union, 1840, the term "Canadian" came to mean the people of Ontario, with the French form referring to those of Quebec (O.P. Dickason, personal communication).

It must be noted that the English speaking population in early Canada can not be automatically categorized as Englishmen. Early Hudson's Bay Company employees, as has been mentioned, were oftentimes Scottish. Also, at the time of the U.S. Revolutionary War, a large number of American Loyalists moved to the maritime provinces. This resulted in a large number of residents who had affinities for British institutions but had been active in democratic procedures in a North American context. In 1867 the Dominion of Canada was created by the British North American Act and, later in the century, other Europeans such as the Scandinavians, Germans, Poles, and Ukrainians began to form a sizeable portion of the population. Even so, it was not until 1947 that residents of Canada were officially considered Canadian citizens rather than British.

Clothing usage by the Canadian expeditions, which included a number of men of non-English descent, suggests a blending of two outfitting strategies. The researcher concluded that Canadian explorers commonly devised necessary protective clothing techniques when required in the field situation, in the manner of American explorers, yet Canadian government policy was to provide whatever clothing was expected to be needed, as done by the British. For example, the North West Mounted Police utilized traditional imposed dress requirements. Yet, men in the organization maintained the flexibility to alter elements in the clothing assembly spontaneously when harsh environmental conditions warranted modifications. Commonly, the clothing elements worn on the upper and lower trunk areas were of regulation materials and design, while clothing for the hands and feet were of native design or improvised by the wearer so as to be satisfactory during wet or cold conditions.

Other Canadian examples are the expeditions sponsored by the Canadian Geological Survey, in its early years, or the government sponsored Canadian Arctic Expedition, that lasted from 1913 to 1918. One finds that Canadian government agencies most often provided generous funding for arctic expeditions. At the same time, expedition leaders were left to make all decisions and handle purchasing of expedition clothing.

As a general conclusion, English expeditions tended to utilize attire planned and paid for by governmental agencies. Canadian expeditions, in the later decades under consideration, tended to have clothing needs generously financed, with choice of materials and design left to expedition leaders. American expeditions most often were supported by private individuals; degree of funding for expeditions to the Canadian Arctic varied from virtual poverty to extravagance. The types of clothing utilized depended on the personal choice of expedition personnel or the desires of the sponsor.

Clothing as symbol of cultural behavior and cultural knowledge

Documenting clothing variation of non-native men in the Canadian Arctic, in effect, compares one aspect of the material culture of certain populations through time and geographical space. As discussed earlier, there were major strategy differences between British and American explorers in obtaining the appropriate clothing for northern environmental conditions. These differences can be explained by considering choice of dress as the employment of a symbol which has cultural meaning.

While having to adapt to the harsh environment of northern Canada, the explorers had to adapt both to the social environment of their immediate surroundings and to the expectations of expedition sponsors back home. For example, British officers included in their written reports to the Admiralty indications that they had successfully maintained Sunday dress standards. Americans wrote letters to their friends demonstrating how self-reliant they were in providing for themselves.

There can be no doubt that British explorers were well aware of Inuit technology for native dress. It is known that natives were taken to England and Europe, with much publicity, as early as 1498. By 1774 impressions of North American native dress design had been published and the British readily formulated concepts of what constituted "savage dress." However, it can not be construed that the early explorers used this information to modify their own clothing assemblies. This may seem strange in light of the apparent advantages of native cold weather clothing technology. To be aware of a technology, as the British were of native clothing, does not mean acceptance and application of the technology to their own situation. The transfer of a technology, in this case native clothing design, must be seen within the cultural context of British society.

Clothing is a highly visible symbol that acts as a sign to the wearer and onlooker; it signals the ideology and status attributes of the wearer. By using clothing as a visible symbol the explorer had at his disposal a means to communicate non-verbally. However, clothing only functions successfully as a symbol when all parties involved understand the behavioral rules and cultural values implied when the symbol is employed. Officers, crew members, traders, and native people needed to interpret mode of dress with the appropriate concepts. Within different cultures certain clothing assemblies may elicit varying behavior, dependent on rules that have been learned through past symbolic communication and upon the extent to which the individual has internalized a rule so thoroughly that deviation would demand strong justification. What would work successfully as symbol in a British context might not be of any use within an American context. The extent to which the British expedition personnel valued traditional English clothing is a clear indication of the rigid, non-wavering use of clothing as symbol in British society. It is apparent that American explorers utilized clothing as symbol to the same extent, but in a very different manner.

Exploration leaders of both nationalities assigned meaning to their clothing assemblies, consciously or unconsciously, and then expected others to act towards them on the basis of the meanings held by the wearer. In general, both English and American explorers had come to the Canadian Arctic to experience the environment as hazard, as a challenge to overcome for its own sake. Career advancement or notoriety demanded favorable publicity upon return. Data collected in this study indicate that clothing was utilized in portrayals of the explorer to create an appropriate image. The Englishmen used clothing to suggest that the British value system remained intact in spite of environmental hazards; the American used clothing to suggest that the frontier spirit prevailed.

By contrast, the Canadians were most often present in the North in order to fulfill duties inherent in their particular vocation. This might be maintenance of a trading post, policing a settlement, ministering to a people, or mapping a terrain. The clothing worn by Canadians, then, needed to communicate their role to on-lookers so that the job could be completed successfully. If modifications to the clothing assembly were necessary for participation in required activities the changes were readily made. As symbol the clothing was to communicate to the sponsor, usually a government institution, that the assigned task was in the process of implementation.

Clothing fulfilled a larger role for the Englishman and the American. The activities of English and American parties had to elicit enthused response from sponsors and from the public. The English, by maintaining traditional attire, and the Americans, by using and extolling native skin and fur clothing, used clothing to express the values, attitudes, and interests of the people at home.

Each of the British arctic expeditions was one of many journeys supported by the Admiralty or other agencies to further English interests in North America. To obtain recognition as a leader of an expedition, one needed to demonstrate to his superiors that English traditions were being upheld and perpetuated. How the Englishman actually dressed when working alone in isolated regions may remain unrecorded. Written and visual communications to the Admiralty and subsequent releases of this information to the public, however, portrayed British men in clothing that emphasized that British social traditions were being maintained by expeditions representing British interests in the Arctic. Expedition clothing reflects British national goals and career goals of individual officers.

In the case of American expedition leaders, clothing is used very effectively to enhance the image of the explorer as a self-reliant, daring frontiersman. In contrast to the rigidity and submission to authority that clothing symbolizes in the British context, the adaption of native clothing and strategy techniques by Americans symbolized the romantic heritage of the United States, both to sponsors and to the American public. As the American expeditions most often were short term projects, designed to fulfill the individual goals of both the sponsor and the expedition leader, one chose to adapt techniques known to be most successful. In the case of clothing, this meant that it had to serve satisfactorily so that the chosen destination could be reached and, secondly, that it might stimulate the imagination of the population at home. Responsibility, dedication, and perserverance were not sufficient for glory in the United States. Greater value was placed upon individualism and the clothing assembly was readily used to symbolize this personal quality.

In summary, the researcher feels that differences in clothing usage by British and American men in the Arctic reflect differences in cultural behavior. These contrasting clothing assemblies function as symbol in each respective country because of the differences in social attitude between the English and Americans. Non-native Canadians who were active in the Arctic used clothing as symbol with less vigor in communication with others.

Diffusion, cultural borrowing, innovation, and creativity

Both the British and the Americans had knowledge of native technologies. The style of British exploration, that is, the large size of expeditions and the hierarchical arrangement of Admiralty, officer, crew, and native prevented use of most of the adaptive strategies used by native groups, however. This is especially true in the case of clothing. The style of American exploration, by contrast, encouraged the use of native technologies because expedition parties were small enough so that the extra numbers of people present in a given area would not usually deplete the resources for subsistance. Also, the romantic idealism of the American people encouraged social interaction and borrowing of techniques between native and non-native.

Native and non-native were not strangers after centuries of whaling and fur trading contacts. It has been emphasized that the British and the Americans traded extensively with native people. Canadians, especially, through social contact and intermarriage had interacted sufficiently to bring about a distinct cultural group which, in Canada, is called the Metis.

The many descriptions of native clothing contained in written narratives indicate the extent to which European clothing practices had become embedded in native culture. At the same time, the development and improvement of suitable cold weather clothing strategies by European explorers over the decades owes much to the native peoples from whom many principles of thermal insulation were borrowed and adopted.

Barnett (1953) has thoroughly discussed the correlation between individualism and innovative potential. The British dependence on authority certainly limited the extent to which clothing innovation occurred during an expedition. Individual leaders had not been given the freedom to reorganize dress standards at will. This contrasts with the American explorer who had few qualms about utilizing whatever resources were at his disposal to create satisfactory clothing assemblies at times when changes were needed in the field situation.

The innovation and creativity that sparked new methods of dressing for the cold with the resources that were at hand did not, however, place Americans ahead of the British in the development of appropriately designed cold weather clothing. Because the British traditionally compiled detailed written reports and enormous stock inventories the result was an understanding of the strengths and weaknesses of regulation clothing. This, in turn, encouraged a slow, but steady, evolution toward more suitable fabric characteristics and clothing supplies for men working in cold environments.

The experiences of the various American expedition personnel did not necessarily build upon the other in the same manner, nor did one expedition leader have any obligation to follow the recommendations of previous explorers. Written daily reports were kept only when expedition personnel were personally interested in maintaining a record for personal reasons. Since the individual retained the freedom to choose his own clothing and to obtain it as he saw fit, the degree of innovation and creativity possible depended on the expertise of the leader and crew and the resources available. Resources included actual financial aid, plus the presence of native people and the availability of sufficient wildlife and, most importantly, the innovativeness and creativity of the leader and the crew.

Over time, business establishments developed various lines of clothing specifically for cold weather conditions. Based on documentary sources surveyed during this study, one concludes that the majority of manufacturers who supplied expeditions with woollen clothing were English, while the majority of companies who supplied cotton textile products were American.

The development of commercial businesses that would assemble total wardrobes for specific environmental conditions brought about a modification of the types of interactions that occurred between native and non-native. No longer did the explorer or his expeditor need to seek clothing articles directly from native communities. Only for footwear, of a quality unavailable from commercial firms, did the non-native explorer need to deal directly with native peoples to secure necessary clothing items. However, it is interesting to note how many explorers chose to wear native-styled clothing assemblies, despite a variety of readily available clothing options. This cultural borrowing indicated the continued appreciation of native materials and design for cold weather dress.

Materials used for clothing construction

The most important factor influencing selection of garment materials was concluded to be mode of initial travel by the expedition party. A group that was ship-based but travelled out from the ship, even for weeks at a time, was usually supplied with a large variety of clothing products.

The fur garments used by non-native explorers were constructed of furs that may or may not have been tanned. They were made of:

1) partially processed skins procured by natives, either North American or Greenlanders, with the garment being manufactured either by native craftspersons or by men on shipboard;

2) skins brought from England with garments being made in England or on shipboard, the skins being either raw or tanned;

3) skins tanned commercially in other countries, such as Russian, or tanned by native groups in these countries, e.g. the Samoyedes;

4) untanned skins obtained from native groups or secured through hunting by the men themselves.

Garments made of fabrics came from a number of sources. The clothing was:

1) the same winter woollen clothing that the men would normally wear at home which was brought along for wear on the expedition;

2) specially stocked clothing purchased from ship's stores;

3) clothing, or fabrics for clothing, provided free by the government or a private funding source for men on the expedition;

4) clothing, or fabrics for clothing, purchased from Hudson's Bay Company posts while in Canada.

Woollen fabrics, used for the manufacture of clothing, were extremely important for those expeditions that had garments supplied by a clothing expediter, whether the expediter was the government or a private firm. While the weight of wool fabric was a problem in instances where men had to carry all of their supplies overland, it was the most available and most suited fabric material for supplying clothing in quantity.

By 1900 clothing was made by certain companies specifically for harsh environmental conditions. For example, the Burburry Company and Jaeger's, both still active today, supplied much clothing to northern expeditions. At the turn of the 20th century Dr. Jaeger (Jaeger, 1907) had developed a whole system of woollen clothing, as well as a philosophy of healthy dress which required that only wool be used for clothing. This idea was strongly in vogue at this time. From the data that were reviewed, one concludes that woollen clothing from Jaeger's Sanitary Woollen Company predominated over that of other companies in supplying northern expeditions with fabric clothing.

Overland expeditions, no matter the country of origin, were limited in the quantity of materials for clothing construction and repair that could be carried along; quantity of fur and fabric clothing that could be taken while travelling was determined by weight and bulk. Thus, by necessity, clothing and clothing materials were secured as needed at trading posts or by trade with native groups when a man's initial clothing supply was no longer adequate. The explorer assumed that needed textile products would be available at posts; commonly, not all of the desired articles could be procured. In these cases expedition leaders were required to either seek out a native family to secure local materials and manufacture necessary clothing items or to substitute and improvise with skin and fabric items that were in stock.

The materials from which clothing was constructed were found to be highly important when evaluating the degree of protection from the environment that the clothing assembly would provide.

Whether furs were tanned or untanned, the animal species involved, the season in which the pelt was obtained, and the portion of the animal from which the skin was taken for utilization were important factors in estimating the thermal insulation of the garment.

In the case of fabric, it was the fiber content and structure that controlled the degree of thermal insulation provided. Reports in the literature on cold weather clothing suggest that fiber content does not influence the thermal conductivity nearly as much as does fabric structure.

It was found that single element structures (such as knits), simple weaves (such as chambray, broadcloth, and ticking), and compound structures (such as backed cloths, double cloths, and felts) were all taken on shipboard. In only a few cases was it established what garments were constructed from these bolts of fabric, however.

It was found that certain fabric processes were highly important in fabrics made into clothing. Napping and waterproofing appear to be the most important processes for protective cold weather clothing used during the time under consideration. Box cloth, a thick cloth that is of such tight construction and so heavily fulled that it is almost waterproof, and mackinac, a fabric with pronounced nap, were found to be very important fabrics for cold weather clothing. Duffle and blanket cloth, also napped heavy fabrics, were used on nearly every expedition that was reviewed.

Waterproofing of fabrics for arctic service was of extreme importance. India rubber or caoutchouac was used as a coating on canvas, as well as white lead and sugar of lead (the same lead compound that was used for weighting silk), to create fabrics that were water tight and air tight. The invention of Charles Macintosh and the process of the vulcanization of rubber, which was common by the mid-1800s, added significantly to the development of protective clothing materials for usage in the Arctic.

A minor, but interesting, difference in British and American choice of materials for manufacture of clothing while in the North is the use of dog skin. It was never mentioned in any of the sampled written documentary source materials representing British expeditions, yet dog skin was a common material for socks and mittens made by the Americans. It is likely that this reflects a philosophical difference in the usage of dogs. Most British leaders felt it inappropriate to use dogs for hauling sledges and they were hauled by the men themselves. Consequently, fewer dogs were on location and fewer skins were available for clothing manufacture; in all likelihood, the British would tend to not use dog skins when a choice was available since the use of the skins of "man's best friend" may have been considered repugnant.

Cut and style of clothing

As fashionable coats for men in England became shorter towards the middle of the 18th century (Byrde, pp. 132-138), the coats worn by officers on British expeditions did as well. Weight of garments, as a result, decreased at this time. This was due to changes in the cut of the clothing rather than resulting from a change in materials.

Design of exploration apparel by the 1850s suggests awareness of the need for air entrapment inside the clothing assembly. This knowledge appears to have been gained by conscious observation of Inuit clothing design. Jackets are shown in visual documents to be hooded with a "comforter" (scarf) often tied about the neck; pants are tucked into the knee-high boots instead of hanging loose at the ankles.

Generally, the researcher learned little about clothing articles for the lower trunk. While clothing ensembles utilized by native people traditionally did not include undergarments, the non-native appears to have worn them in nearly all instances. Knitted drawers, chamois drawers, red flannels, flannel and underwear were some of the names used by the men. A study by Fonseca (1970) concluded that underwear has much less to do with heat transfer than outerwear. Nonetheless, undergarments do constitute at least one extra layer of clothing. However, this layer can not be established from visual data and is not always mentioned in written sources; therefore, the number of layers worn on the upper and lower trunk could not be established in as many cases as had been hoped.

Garments that covered both the upper trunk and lower trunk were coded in several different categories, that is, "1 piece outfits," silk or duck overalls, and long coats of various sorts. The long overcoats worn in the earlier decades included in the study suggest that the fashionable "great coat" of the early 19th century was worn by officers; it was long and loose and likely rather cumbersome and heavy. Not only would a coat like this provide insulation to the lower trunk as well as the upper trunk, it also made it impossible to view the lower trunk in order to gather data from visual sources.

A number of construction features were important in estimating the thermal insulation provided by a given garment or an assemblage of garments. Stitching detail, reinforcements of corners and seams, easing in of fullness and gathers, linings, underlinings, and interfacings are variables to be studied in tailored garments. Ease allowed in fitting is highly important when clothing is intended for difficult chores; seam finishes may be important to the airtightness of a garment when wind velocity is high. Whether or not an outer garment has a lining and an interlining is of extreme importance when counting number of layers of a total clothing assembly to estimate clo factor or thermal insulation. As well as influencing the fit of the garments, the cut of pattern pieces is highly important in the "bellows effect" of a garment, i.e., the amount of air blowing into the clothing ensemble as the man walks, the "hobbling effect" caused by the bulkiness of the garment, and in the "venting effect," i.e., the ability of the garment to release body heat when the wearer is overheated.

Virtually no discussion of decorative elements was found in any of the written communications; this supports the idea that ornamentation is second to insulation in functional cold weather clothing. It is worth noting, however, that clothing representing one's rank was worn on those occasions where specific first impressions were considered of prime importance. Whether Sir John Franklin was meeting an important Indian chief, an American scientist was going into a new native village, or a ship captain was meeting officers from another ship, clothing choice took more factors into consideration than merely meeting the requirements of climate. It is also due to these "psychological aspects of dress" that the initial assumption that visual representations of historical cold weather clothing would prove to be misleading appears to be borne out. No drawings were located of British naval personnel that did not show traditional English clothing being worn, although in some decades furs and native clothing were utilized on occasion. By contrast, drawings and photographs of American explorers emphasized and likely exaggerated the use of completely native clothing ensembles.

Materials used for footwear construction

The leather boots brought by men from home were called boots, shoes, civilization boots, and sea boots. These were made of smooth leather, the species of animal from which the leather was derived has not been established by the researcher, although description has been facilitated by microscopic examination of the footwear artifacts located on Banks Island and Melville Island.

The leathers were tanned. All European-style footwear is assumed by the researcher to have been vegetable tanned since the Schultz process for chrome tanning did not begin until 1884. The sole leathers that originated in Britain prior to 1850 are likely to have been done with the oak bark (*Quercus robur*) process as this was most common. Sole leathers produced in North America were probably tanned with a combination of barks. In Canada, oak (*Quercus prinus*) was most commonly used for tanning heavy leathers. In America, this oak was commonly combined with hemlock or spruce for the tanning material. The principle tanning agent used in the United States at this time, however, was the chestnut tree (*Castanea sp.*).

In the middle and latter part of the 19th century British heavy leathers were tanned by processes combining oak and other barks such as mimosa (*Acacia sp.*) and mangrove bark (*Rhizophora*, *Bruguiera*, and *Cerop*). After the 1870s extracts such as of chestnut and quebracho (*Quebracho colorado*), a South American tree, were imported to England for use in tanning work shoes. Around 1910 synthetic tannins were experimented with and used to some extent with sole leathers; the synthetic tannins, while not extensively used for leather for most footwear before 1920, did significantly replace alum and salt tanning for sheep and fur skins (Adcock, n.d., pp. 32-51; Humphreys, 1966, pp. 54-88). None of the footwear artifacts that were located have been tested for tannins to date.

Rubber was not mentioned commonly as a material used in the manufacture of cold weather footwear. Of more importance was the use of cork as a sole material. Probably because of its imperviousness to water, its low specific gravity, and low thermal conductivity (Cooke, 1961), it was commonly used by the British, at least after 1850. Waterproofing compounds like caoutchouc, white lead, or greases were used to maintain water repellancy in footwear. Better still was the native footwear made especially for protection under wet conditions, when it could be procured.

Fabrics were used extensively in outer footwear for the North. Shirting, ticking, felt, and especially canvas were important. Surviving footwear that utilizes these materials exists and, in all likelihood, can be made available for detailed study of the textile materials. The survival of inner footwear, such as socks, stockings, boot hose, heeled boot hose, etc., has been established in some instances; the researcher has analyzed, for example, the knit wool stocking artifacts located on Melville Island.

Shoe tacks, nails, and wooden pegs were used to join upper to sole in the early decades. American invention of the shoe nail in 1812 and the sewing machine patented by Elias Howe in 1846 created changes in the shoe industry that are reflected in footwear worn in the Arctic. The nail replaced the wooden peg and plain and waxed thread came to replace the nail. Tentative identification of the fibers found in the stitching of shoes left on Banks Island by the McClure party mid-19th century indicates the use of hemp or linen. This stitching thread was used in conjunction with wooden pegs.

Inuit-made footwear that was used by the explorers was mostly of seal or caribou leg skins. Soles were commonly of "ugruk," the bearded seal. Tanning, if ever done, was never mentioned. It is assumed that the skins remained untanned; processing was by scraping, working, and, in some cases, chewing by the women. Treatment of the skins with oil was not mentioned in the written accounts, nor was the identification of the threads used by the Inuit women. One assumes the thread was of sinew, but with the great amount of trade being conducted one can not say this conclusively. Examination of surviving native footwear from the various decades and geographic locations would easily settle the question. Moose skin was the most commonly mentioned footwear material in the Indian-produced footwear used by the European explorers. No detail on skin processing or thread materials was encountered in the written sources.

Cut and style of footwear

There is no evidence that footwear made by native women for wear by European men was constructed differently than had it been made for native persons. Kerkhoven (personal communication) has suggested that instances may have occurred where European men were provided with women's styling as an Inuit community joke. Many written communications suggest that it was difficult to acquire native footwear of the correct foot size. This is probably because European men tend to have larger feet than native persons and, consequently, required larger sizes than the women were accustomed to making. This presented a continual problem for the early arctic explorers.

European-made boots found in the early Canadian North reflect the great diversity of boots that were to be found in the United States and, especially, England at this time. The names of some of these types are mentioned in the literature review in Chapter 2. It has not been determined exactly what boots were developed especially for arctic protective gear. Finnesko, footwear developed in northern Europe, and mentioned occasionally by some expedition reports, was utilized because the design was suited for the cold environmental conditions. The large size and flexibility of "easy boots" clearly was in response to the need for a loose fitting design when performing certain chores in the arctic climate. It is important to note that the term "moccasins" when appearing in written communications does not necessarily refer to native-made footwear. At least by the British, it was often a stylistic designation that implied some form of "easy boots." It is clear that men, while in the North, made modifications to existing footwear (such as adding shirting material to Canadian moccasins to create moccasin-boots) and also manufactured "easy boots" for their own use. It is also known that some ship-based parties had actual shoemakers on board who could manufacture traditional European footwear while on location in the North.

Very little detail was established on the type of fasteners used in the European-styled footgear. Boots appear to be merely pulled on, generally shoes appear to have laces and tie-holes; this is borne out by study of the 1850s artifacts recovered from Melville Island and Banks Island.

Written records did not provide data on footwear cut and visual records were not felt by the researcher to be accurate representations of actual footwear. It does appear that, at least until the 1860s, the footwear was cut as "straights," that is, that boots and shoes were made to fit either foot rather than being for either the left or the right foot. Native-made footgear was cut as "straights" all through the years under discussion.

Only with the examination of surviving artifacts was it possible to establish the number of pieces used in construction, the diameter of the leg cylinder, its height, and the thickness of the sole. This took into consideration the fact that some dimensional changes possibly occurred from time of use to the present day.

The native-made mukluk conformed to Hatt's structural designation, the mukluk-sandal boot. Skin stockings were commonly used, especially by the Americans, but the cut of the stocking was never mentioned in the documentary sources. The blanket sock or wrapper, the square of fabric used commonly by the British inside "easy boots," would fit only into Hatt's third category, that is, that the stocking was not a copy of the outer boot. Leggings were only worn by the men when utilizing Indian-made footwear; no detail on the leggings was given in the written sources and was not clear from visual sources. The use of European spats was encountered occasionally and one assumes that they were worn only with European-made footwear.

In no instance was color or decoration and ornamentation of the footgear mentioned in the written data concerning footwear used by the men. The artifacts that have been examined show some examples of incised initials, probably those of the maker or the wearer.

Several instances were recorded where elaborately decorated footgear, both Indian and Inuit-made, were presented as a gift to a man by a native person or were commissioned for manufacture by an officer for him to keep as a souvenir or to give as a gift to someone special. Nowhere was it found, however, that this special footwear was worn in the Arctic. The one exception to this, though, was the footwear worn by the missionaries who resided as permanent residents in the Canadian North. Probably it would be equally true of traders and post managers although data supporting this idea were not located.

VI. Summary

A study was devised to 1) locate and record sources of written information pertinent to historic cold-weather clothing and footwear, 2) to utilize written, visual, and artifact documentary sources to provide a general survey of clothing worn by non-native men in the Canadian Arctic, and 3) to compare the usefulness of these three types of documentary materials.

The procedure was 1) to conduct a pilot study in order to develop data recording devices for the collection of information, 2) to collect information from documentary sources so that clothing usage might be summarized and comparison of documentary sources could proceed, and 3) to conduct manual and computerized literature searches in order to begin a bibliography of useful sources for the study of historic cold weather clothing.

Based upon data that were located, findings were presented in temporal sequence. From these findings, clothing practices were discussed 1) in regards to time and space, 2) as symbol of cultural behavior and cultural knowledge, and 3) as evidence of diffusion, cultural borrowing, innovation, and creativity. Details were noted pertinent to material, cut, and style of clothing procured for use by the explorers.

Recommendations for future research will follow.

VII. Recommendations

At the initiation of the study the researcher believed that it would be possible to ascertain the clo factor of the clothing assemblies worn prior to 1920 in the Canadian Arctic and, subsequently, that it would be possible to utilize the research results of Auliciems, de Freitas, and Hare (1973). After reading and evaluating many recent publications on human physiology, thermal insulation, and textile testing that were located in the course of the bibliographic searches, the researcher concluded that under very cold climatic conditions there is no way to dress the extremities in a totally satisfactory manner for very cold temperatures. Thus, even though in some instances the total number of layers of footwear articles worn by a man under certain environmental conditions was established, the researcher concluded that the clo factor of footwear alone is not meaningful without establishing the clo units provided by the total clothing assembly. Because an objective of this study was to give only a general picture of historic clothing practices in the Canadian Arctic, the data gathered were not sufficiently detailed so that one could estimate the clo units provided by the total clothing assemblies.

The researcher concluded that a team approach would be ideal for successful completion of a study concerning thermal insulation of historic cold weather clothing. It would demand 1) further documentation of historic clothing materials, design, and the environmental conditions under which this clothing was worn, 2) replication of this clothing with equivalent materials and elements of design, and 3) field testing of these clothing assemblies by experimentation with living subjects so as to measure physiological responses that occur within the body while various types of clothing are worn under differing environmental conditions. Certain conditions most certainly could not be replicated such as the months of starvation or the symbolic importance of certain clothing assemblies.

It is recommended that modifications be made to the data recording sheets if the methodology used in the present study is to be used in future studies. Two important variables were excluded from the data recording sheets; these are head coverings and weight of garments. Suitable headwear is of extreme importance in the prevention of loss of body heat.

It was not realized by the researcher until well into the study the great importance of weight as a factor in cold weather protective clothing for expeditions. Whenever available, data on the weight of the clothing assembly should have been recorded so that total weight of the ensemble could have been calculated. It is especially important to determine the type of footwear that was in use since weight carried on the feet results in a much greater energy expenditure than a similar weight carried on the upper torso. Since there is a large weight difference between European-styled leather boots and native-styled moccasins, mukluks, and kamiks, knowledge of which type was being worn is of critical importance in an analysis of a total clothing assembly. Weight carried by a man while performing his duties is especially important in total energy expenditure when working under harsh environmental conditions. Weight changes, over the years under consideration, are less significant for all expeditions with American and Canadian personnel, compared to the British expeditions, due to a heavier reliance on native materials and native-manufactured clothing. Future studies of historic cold weather clothing should record sufficient data on weight differences so that comparisons might be made.

At the outset of the research project the researcher was unaware of the great contribution by Greenlanders in the outfitting of expeditions bound for the Canadian Arctic. It is recommended that future research seeking to document historic protective clothing used in the Canadian Arctic focus on two major sources for clothing procurement. The first, the Hudson's Bay Company, is no surprise. Establishing the textile tools, materials, and the manufactured clothing available at various posts across the Canadian North is important to understanding clothing procurement and usage by the early explorers.

The second major source of supplies appears to be virtually unexplored by North American or European researchers; this is the contribution by the people in various coastal settlements of western Greenland, the island territory of Denmark, which at its closest point is only 16 miles from Canada's Ellesmere Island. Routinely, British and American ships stopped at cities such as Godhavn or Upernavik to take on supplies. Like the British who sent supply ships on a regular basis to ports in Hudson Bay to take goods to their colony of Canada, the Danes regularly sent supply ships to settlements in Greenland (see Tejsen, 1977). The type of textile and clothing goods brought from Denmark to Greenland was not explored by this author, yet it would be important information in a study of clothing technologies employed by Greenlanders in the manufacture of clothing and footwear for Arctic explorers.

A study of the similarities and differences of clothing practices of Europeans in Greenland with that of non-natives in northern Canada, and the contributions that Inuit played in each case, would be a particularly timely topic for future research. Ethnic awareness by the Canadian Inuit and the Greenlanders and a desire to understand each other's cultural heritage is an important factor in the North today. Since clothing is such an important aspect of the material culture of a people, greater knowledge of the historic functional clothing utilized in Danish Greenland, in many ways similar in environment to northern Canada, would contribute to understanding of protective dress used by the British or Americans in northern North America. A comparative historic study of cold weather clothing design utilized by Europeans in Greenland and non-natives in arctic North America would be highly relevant to contemporary issues in the rapidly changing North; the researcher feels that a study concerned with clothing procurement and utilization for extremely cold conditions would fill a real gap in our knowledge of clothing design for specific environmental conditions, as well as add greatly to an understanding of innovation and cultural borrowing.

Oftentimes, clothing utilized by various cultural groups may differ significantly in ways that are not initially apparent. It is recommended that, whenever feasible, representative clothing and footwear artifacts be scrutinized by laboratory analyses so that the nature of fabrics, threads, skins, and leathers may be described. While this is commonly done with textile components in clothing collections, it is commonly ignored when describing leather or skin components. This appears to be especially true in regards footwear artifacts.

Physical examination of skin materials should be conducted to establish the animal species involved. In cases where only minute fragments of the artifact can be made available, investigation might proceed using the electron microscope (see Reed, 1972). This technique may be especially useful for detecting vegetable tannins in leather and for estimating the intensity of treatment given to the skin with the vegetable tannin liquor. While the different tannins can not be distinguished on the basis of electron micrographs, one has a basis for deciding whether one is justified in altering the artifact to the extent necessary to extract a sufficient solution for chemical testing in order to separate and classify the tannins that are present. Classification of tannins is a difficult procedure and it may only be justified in very few cases.

The researcher located few studies that provide detail on skin and leather processing methods. Because clothing made of animal hides is highly important in cold weather clothing design, both in the past and today, it is recommended that researchers place greater emphasis upon documenting the processing of animal materials utilized in northern clothing.

The technology of clothing, that is, the choice of available resources for construction of needed clothing, as well as the methods used to make these materials suitable for use, can tell much about the culture of a people. It is this which makes the study of clothing fascinating.

Footnotes

1. A Welsh wig is a type of cap, made of worsted wool, that was commonly worn by British travelers in the first half of the 19th century.

2. Gutta percha is a material obtained from the latex of some trees (especially Palaquium oblongifolia). It was processed, pressed into blocks for storage, and before use was heated so as to become sufficiently plastic so that it might be spread over the surface of an object in a thin layer. This treatment made the object water resistant.

3. The term "Guernsey" is derived from the name of one of the Channel Islands. Commonly, a Guernsey frock refers to a loose fitting coat; sometimes, however, a thick, knitted, close fitting vest or shirt that was worn by seamen and commonly made of blue wool, is called a Guernsey frock.

4. Wadmil, wadmill, and wadmal all refer to a coarse woollen cloth that was used for doublets and jackets in the 19th century. In England the name implied a cloth mostly used by the poor, while in Scotland it refered to a woollen fabric woven in Orkney and Shetland.

5. Comforter was the word used by the British for a woollen scarf that was worn around the neck in cold weather.

6. The term "lanyards" refers to a cord worn around the neck to attach some object so that it would not become lost.

7. Crape is the old spelling for a transparent silk fabric that today would be spelled crepe. Before the 19th century it was always black and was used for mourning. In the 19th century it was still used for this purpose, but it was made in a variety of colors and used for other purposes as well.

8. The researcher remains unclear as to the exact meaning of nettlestuff. Various species of the nettle plant family (Urticaceae) were used for the manufacture of cloth and cordage in the 19th century. Nettlecloth was one name for the cloth. In the 1850s the Germans developed a material from the fibers that was intended to serve as a leather substitute. Thus, nettlestuff could possibly refer to this when used in the context of shoe repair supplies.

9. Flushing was the name of a rough, thick woollen cloth. It is always capitalized because it was named after a port in Holland.

10. The researcher was unable to establish the cut and style of stoga boots. They appear to have been manufactured in the United States.

11. Fearnough was a type of thick heavy fabric that was usually highly napped so as to make it practically impervious to wind and rain. This same fabric was occasionally called dreadnought.

12. Finnesko is a general term for loose fitting cold weather footwear obtained in the Scandinavian countries.

13. Vodmal or vadmal was a woollen fabric (like wadmil) that was woven in Scandinavia or Iceland.

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Appendix 1

DATA RECORDING SHEET
IDENTIFY NUMBER

*_____(4)footcase

ARCHIVAL INFORMATION

_____(1)typedoc
_____(2)locdoc
_____(2)docsorc1
_____(2)docsorc2
_____(2)shoetitl

TEMPORAL-GEOGRAPHICAL CONTEXT

_____(3)year
_____(1)yearaccur
_____(2)month
_____(2)day
_____(2)expedloc
_____(2)latitude
_____(3)longitud

CLIMATIC DETAIL

_____(1)cloudcov
_____(1)zero
_____(2)temp
_____(2)windvel
_____(1)qualwind
_____(1)snodrift

EXPEDITION DETAIL

_____(2)travelme
_____(2)no.month
_____(2)dbarkpt1
_____(2)sponorg
_____(2)reason1
_____(2)reason2
_____(2)expediter
_____(2)overwint
_____(2)natives1
_____(2)natives2
_____(1)numpres

WEARER DETAIL

_____(3)namewear
_____(1)national
_____(1)race
_____(2)occupat
_____(2)age
_____(2)rank
_____(1)actlevel
_____(1)foodsup
_____(1)health
_____(1)dress

DRESS DETAIL

_____(2)upper1
_____(2)upper2
_____(1)minupper
_____(2)lower1

______(2)lower2
______(1)minlower
______(1)handger1
______(1)handger2
______(1)minhand
______(2)garfeet1
______(2)garfeet2
______(2)garfeet3
______(2)garfeet4
______(1)minfeet
______(2)clomaker
______(3)shoemake
______(2)manufloc

FOOTWEAR DETAIL

______(2)upmat1
______(2)upmat2
______(2)upproc1
______(2)upproc2
______(2)solmat1
______(2)solmat2
______(2)solproc1
______(2)solproc2
______(1)lining
______(2)thredmat
______(1)sewtech
______(2)numpiece
______(2)fasten1
______(2)fasten2
______(1)tongue
______(1)soleloc
______(1)solemeth
______(2)legmeas
______(1)heitleg
______(2)topcirc
______(1)pantsin
______(1)toeshape
______(1)solshape
______(2)solthick
______(3)heelheit
______(1)inerboot
______(1)color1
______(2)color2
______(2)decor1
______(2)decor2
______(2)decor3
______(1)motif

* The numbers in parentheses represent the number of columns utilized in formating the variables for the SPSS program.

Appendix 2

FIELD NAMES, DEFINITIONS, AND COMMENTS ON THE FOOTWEAR DATA BASE

Footcase: the case number of the footwear for which the data recording sheet is being completed. The footwear case is the unit of analysis which the variables seek to describe or measure.

Typedoc: the type of documentary evidence utilized in obtaining the footwear case. The documents are divided into three categories, that is, 1) written, 2) visual, and 3) artifact.

Locdoc: the institution where the documentary evidence is housed, e.g. The Boreal Institute of Northern Studies, the Glenbow-Alberta Institute, the Public Archives of Canada.

Docsorc1: the most obvious descriptive term describing the character of the document providing the footwear case, e.g. published narrative, unmodified drawing, equipment list, photo caption.

Docsorc2: a second descriptive term relevant to characterizing that same document.

Shoetitl: a descriptive name for the footwear under consideration, e.g. shoe, blanket wrapper, heeled stockings, shoe tacks, sole fragment. The name is provided either by the author in a written communication and recorded in the way he spelled it, or in the case of visual and artifact evidence, the researcher assigned the descriptive name felt to be most appropriate based on date, location, and styling. Coding of footwear from visual communications followed classification schemes of Hald (1972) and Hatt (1969; 1976). The saalsko type, that is, the soled shoe, was called a boot if it was over ankle-height or a shoe if it did not extend above the angle. The hudsko type was termed a moccasin-boot if it extended above the ankle but was called a moccasin if it did not extend above the ankle. Inuit-styled footwear, which does not fit Hald's criteria for the saalsko category because the sole and upper are not joined at the lower edge of the foot, are designated as mukluk-sandal boots. Kamiks, an eastern Arctic term, and native boots are other terms that are commonly used in written communications for this same design. The term hudsko is more narrowly defined than moccasin as used by Hatt. Thus, any native-made soft soled footwear that fit any of Hatt's 21 stylistic categories (see Appendix 5) were either called moccasins or moccasin-boots.

Year: the year in which this particular footwear was in use, either the actual year or the closest approximation based upon other data.

Yraccur: statement as to whether the year noted is known to be accurate or whether an estimate was employed.

Month: the month of the year in which the footwear and clothing assembly being noted on the recording sheet was in use.

Day: the day of the month that this clothing assembly was in use. Generally the month and day of use can be ascertained only from personal diaries and journals. They are important variables, nonetheless, when seeking to establish association between dress and footwear detail with climatic detail.

Expedloc: the name of the geographic location where the footwear was in use, e.g. Banks Island, Great Bear Lake, Ellesmere Island.

Latitude: distance in degrees north from the equator, the degrees given indicating the location of the expedition.

Longitude: the distance in degrees west of Greenwich, England, the degrees recorded indicating the location of the expedition.

Cloudcov: the amount of cloud in the sky while the footwear was in use. For the purposes of the study it was broken into clear, partial cloud, and cloud covered. Of importance in determining the amount of solar radiation is the daily number of hours of sunshine which can be calculated using the date and location of the expedition.

Zero: statement as to whether the temperature that is recorded is 1) above zero Fahrenheit, or 2) below zero Fahrenheit.

Temp: the degrees on the Fahrenheit scale above or below the freezing point on the day the footwear was in use.

Windvel: wind velocity, that is, the speed in miles per hour of air that is in motion relative to the surface of the Earth.

Qualwind: quality of the wind categorized as 1) still, 2) light, 3) moderate, 4) strong, or 5) gale. In 1805 a scale, called the Beaufort Scale, was devised to describe wind velocity; it is as follows:

Beaufort Number	Miles per Hour	Description
0	up to 1	calm
2	4 to 7	light breeze
3	8 to 12	gentle breeze
4	13 to 18	mod. breeze
5	19 to 24	fresh breeze
6	25 to 31	strong breeze
7	32 to 38	moderate gale
8	39 to 46	fresh gale
9	47 5o 54	strong gale
10	55 to 63	whole gale
11	64 to 72	storm
12 to 17	73 & above	hurricane

Most of the British expeditions that took readings of wind velocity reported the results with the above descriptive terminology rather than the actual numerical reading. However, the researcher thought it necessary to employ fewer categories than the 13 in the Beaufort scheme so as to not imply precise measurement by those groups whose communications convey subjective judgments of wind speed.

Snodrift: loose surface snow moving in the wind (which is very unpleasant at head level and thus of significance in the success of certain clothing assemblies). It is categorized as 0) no drift, 1) low drift sustained over the day, 2) low and high drift on the same day, and 3) high drift sustained over the day.

Travelme: prime manner of travel, e.g. ship, canoe, man-hauled sledge, dog-hauled sledge. Inconsistencies arose in coding data because the recording sheet did not provide for handling short term differences in travelling techniques, e.g. 3 month sledge trips leaving from iced-in ships, or excursions that involved combinations of land and water travel.

No.month: the number of months that had passed from the time the expedition left home until the date that the footwear under consideration was being worn. The researcher found herself to be inconsistent in recording these data as it was difficult to define the number or it became meaningless because the group might be re-outfitted at other ports, re-supplied by in-coming ships, or utilize native communities in obtaining replacements for expended supplies.

Dbarkpt1: the debarking point from which the expedition first left for the Arctic, e.g. Scotland, New England, maritime Canada. In most cases, the bulk of supplies were taken from this point.

Dbarkpt2: a second location at which the expedition first stopped for supplies or taking on additional men while on route to the Arctic, e.g. the Orkneys, Holsteinburg (Greenland), Hawaii.

Sponorg: the organization sponsoring the expedition, and often, but not always, the one which provided the bulk of the necessary supplies, e.g. the British Admiralty, the Hudson's Bay Company, the Canadian Geological Survey.

Reason1: the prime reason that the expedition was present in the Canadian Arctic, e.g. geographic studies, search for John Franklin, commercial fishing, religious activity, journalism.

Reason2: a second reason for the presence of the particular expedition in the Arctic. Oftentimes reason 1 and reason 2 were of equal importance or a reason could be inferred by the researcher but was not stated in the written communications. Therefore, judgments were made by the researcher that were not consistent throughout the study.

Expediter: the one employed to secure adequate supplies for the expedition party while in the Arctic, or, the one employed to attend to shipping the necessary supplies on schedule. Examples are the Hudson's Bay Company, the North West Company, Jaeger's of Montreal, or Hunt's of Newfoundland. If more than one expediter was involved, the one who the researcher judged to have played the most important role was recorded.

Overwint: the location, in the Arctic, where the expedition party spent the winter months.

Natives1: the native group with which the expedition personnel had the most personal contact in terms of trade, social interaction, or mere proximity, e.g. the Cree, Dog Ribs, Caribou Eskimo.

Natives2: a second native group with which personal contact occurred.

Numpres: the number of native peoples present in the European/native contact situation, that is, 1) 1 to 5, 2) 5 to 10, 3) 10 to 20, 4) 20 to 50, 5) 50 to 100, and 6) over 100.

Namewear: the actual name of the person wearing the footwear in question. If this information was unobtainable, the identity of the expedition of which the wearer was a member was recorded.

National: the nationality of the wearer, that is, 1) English, Scottish, Irish, 2) European, 3) U.S.A., 4) Canadian, 5) Russian, 6) other. In many cases it was clear that not all of the crew members on a particular expedition were citizens of the same country or of the country from which the expedition originated. Thus, except for identified officers, these data were generally missing.

Race: designation of the wearer of the footwear as Caucasian, Black, North American Indian, Inuit, or other. For non-officers this information could seldom be definitely established.

Occupat: the professed occupation of the wearer of the footwear, for example, career naval man, whaler, anthropologist, North West Mounted Policeman, ship captain.

Age: the age of the wearer of the footwear.

Rank: the rank of the wearer. This designation was not applicable to all expedition parties but was of use for expeditions sponsored by the British Admiralty; examples are Captain, Lieutenant, Able Seaman, and Mate.

Actlevel: the scaled level of activity occurring while the particular footwear was being worn. The activity levels, as defined by Rogers and Sutherland (1971) and similar to those considered by Auliciems, De Freitas, and Hare (1973) are 1) sleeping, 2) sitting, 3) light work, 4) medium work, and 5) heavy work.

Foodsup: food supply available to the group, scaled as 1) abundant, 2) satisfactory, 3) fair, 4) near starvation, and 5) death has occurred from starvation.

Health: the general health of the person utilizing the footgear, scaled as 1) satisfactory, 2) fair, 3) near death, and 4) death has occurred.

Dress: general style of the dress most commonly worn by expedition personnel, that is 1) native-style, 2) European-style, 3) half native/half European, 4) regulation uniform, and 5) handmade in the most expedient manner by the men themselves. This latter category was necessary because of the varying levels of expertise of different individuals and the fact that, in some cases, the resulting garments fit neither the native or European style category.

Upper1: descriptive name of one garment worn on the upper trunk.

Upper2: descriptive name of a second garment worn on the upper trunk.

Minupper: the minimum number of layers of garments that could be documented as worn on the upper trunk while the footwear under consideration was being worn. The variables minupper and minlower are the basis for establishing the clo factor of a cold weather clothing assembly.

Lower1: descriptive name of one garment worn on the lower trunk.

Lower2: descriptive name of a second garment worn on the lower trunk.

Minlower: the minimum number of layers of garments that were found to be worn on the lower trunk while the footwear in question was being worn. A major problem arose in establishing the number of layers because much data were derived from clothing and equipment lists. Thus, one could list descriptive names of two upper trunk and two lower trunk garments but one could not list the minimum number of layers because it remained unclear as to what was worn simultaneously and what was carried as extra clothing. Also, outer garments were taken on and off during the day as activity levels varied so even when one could establish number of layers worn when a march was begun, one could not state later in the day the number of layers being worn. Technically, information on clothing usage should not have been recorded on the data recording sheets if it was derived from equipment inventory lists because it was not actually being worn at the time. Initially in the study this data was recorded as missing; further into the study it was recorded from clothing lists as the researcher felt that it was of more value to note its presence than to not be able to retrieve the clothing information later while utilizing the SPSS computer program. This inconsistency, in the course of the study, was of serious consequence and should not be repeated in future studies.

Handger1: descriptive name of the clothing worn on the hands, e.g. gloves or mittens.

Handger2: descriptive name of a second garment worn on the hands, e.g. liners.

Minhand: the minimum number of layers worn on the hands. In few instances was a second layer established. However, since no mention of a second layer in written records or the unlikelihood of seeing it in a visual communication does not preclude its existence, the data for this category were, in nearly every case, recorded as missing.

Garfeet1: the descriptive name for the layer of footwear being worn on the outside of the footwear assembly.

Garfeet2: the descriptive name for the layer of footwear being worn next to the outside layer.

Garfeet3: the descriptive name for the third layer from the outside being worn in the footwear assembly.

Garfeet4: the descriptive name of the fourth layer from the outside being worn in the footwear assembly.

Minfeet: the minimum number of layers of footwear worn on the feet in the footwear assemblage under consideration. At the initiation of the study the researcher felt that this number would indicate the clo factor and the suitability of the footwear being worn for the prevailing environmental conditions. The researcher now feels that this is too simplistic and clo factor of footwear alone can not be discussed in a meaningful manner.

Clomaker: the individual, group of persons, or commercial company that made most of the clothing worn on the upper and lower trunk while the footwear under consideration was worn.

Shoemaker: the individual, group of persons, or commercial company that made the footwear designated as the variable shoetitl.

Manufloc: the location at which the footwear designated as shoetitl was made. This could be a geographic designation, such as England or Etah (Greenland), or it could be less specific, such as "on shipboard."

Upmatl: the dominant material utilized in construction of the upper of the footwear under consideration. Since the degree to which the materials could be examined and identified depended on the type of documentary sources, and, in the case of artifacts, the policy of the institution in which they were housed, coding categories were both general and specific. For example, categories such as unidentified fur, unidentified smooth leather, and unidentified fabric, along with categories for specific materials, such as caribou, cork, dog skin, and grass, were designated for coding information on materials.

Upmat2: a second material utilized in construction of the uppers of the footwear under consideration.

Uprocl: the techniques used to process the raw materials (upmatl and upmat2) before construction of the upper of the footwear.

Upproc2: a second processing procedure utilized to make the raw materials suitable for construction of the uppers of the footwear. The processing procedures stress the structural make-up of the components of fabric structures, as used by Emery (1966), and a recognition of the methods of processing skin, as discussed by Reed (1972). Examples of the categories utilized for variables upprocl, upproc2, solprocl, and solproc2 are plain knit, twill weave, felting, smoking, chewing, tanning.

Solmatl: the prime material from which the sole of the footwear under consideration is constructed.

Solmat2: a second material used in construction of the sole of the footwear.

Solprocl: the method used in processing the raw materials (solmatl, solmat2) that was used to make suitable the materials for construction of the sole.

Solproc2: a second processing procedure utilized to condition the raw material for sole construction.

Lining: attached material on the inside of the footwear which covers only the insole, a part of the inside of the footwear, or the whole inside of the footwear. This information was never established for cases coming from written and visual documents and it was not present in any of the artifacts that were examined.

Threadmat: the fiber content of the thread used in sewing the footwear, that is, cotton, hemp, linen, or sinew. Other thread materials were not encountered; however, if they had been they would have ben placed in the category "other."

Sewtech: the technology used in sewing the footwear, that is, by hand, by machine, or a combination hand/machine.

Numpiece: the total number of pieces utilized in construction of the footwear (recorded for one shoe, not a pair).

Fasten1: the most important type of closure utilized to hold the footwear on the foot, e.g. lace with tie-holes, drawstrings, ankle-tie.

Fasten2: a second type of closure utilized to hold the footwear on the foot.

Tongue: whether or not the tongue was present or absent on the footwear. This was seldom possible to determine from written and visual sources and turned out to be a problem in evaluating native-made footwear due to the confusing terminology in the literature for tongue, vamp, and instep (see Appendices 4 and 5).

Soleloc: the location of the sole, that is, whether it is of one piece construction, or whether it joins the upper at the base or the top of the foot.

Solemeth: the method used in joining the sole, that is, whether it is sewn, nailed, pegged, bonded, or a combination of these techniques.

Legmeas: the measurement in centimeters from the ground to the top of the footwear. One could seldom expect to recover this information except from surviving artifacts.

Heitleg: the place on the body that the top of the footwear reaches, that is, below the ankle, ankle-height, mid-calf, knee, thigh, hip, or waist-high.

Topcirc: the measurement in centimeters of the circumference of the top of the footwear. This measurement was only available from surviving artifacts.

Pantsin: whether or not the pants were tucked into the footwear, whether they hung over the footwear, or whether they were short and did not reach the footwear.

Toeshape: the shape of the toe of the footwear, that is, whether it was square, round, oval, or pointed.

Solshape: the shape of the sole, that is, whether straights, so that the footwear would fit either foot, or whether the pair was cut for both a right and a left foot.

Solthick: the thickness in millimeters of the sole of the footwear.

Heelheit: whether a heel was present on the footwear, and, if so, the height of the heel in centimeters.

Inerboot: the construction style of the footwear (generally garfeet2) worn inside the footwear, that is, whether none was worn, a European sock or stocking was worn, or one of the types of stockings as outlined by Hatt (1969). In nearly every instance data for this variable were recorded as missing as the construction of the stocking could not be determined. When the recording sheet was set up the researcher assumed that all arctic footwear would be worn with "inner boots," as is the case with much native-styled winter wear. This did not prove to be the case and the variable was generally inappropriate.

Color1: the dominant color of the footwear.

Color2: a second color clearly visible on the footwear. While the purpose of these two variables was to record ornamentation and dyeing practices, the only colors ever recorded were browns, blacks, and the natural colors of the furs. On occasion, visual representations showed very colorful footwear in painted renditions of Arctic scenes; however, the effect was always so visually pleasing that the researcher had no confidence that artistic license was not the cause.

Decor1: the most striking decorative element on the footwear, e.g. quill work, tassels, accessory stitching.

Decor2: a second decorative feature found on the footwear.

Decor3: a third decorative feature found on the footwear. The researcher was surprised to find almost no evidence of decorative work on any of the footwear cases.

Motif: the general type of decorative work on the footwear was categorized as 0) none present, 1) geometric, 2) concentric, 3) plant, 4) animal, 5) general representation, 6) other. As stated above, in nearly every instance, no motif was present.

Appendix 3

FOOTWEAR ARTIFACT SUMMARY SHEET

FOOTWEAR NAME:

I. ARTIFACT LOCATION AND ACCESSION NUMBER

II. KNOWN HISTORY OF THE ARTIFACT: (e.g. maker, earliest possible date of manufacture, date of collection, original owner, field collector, social/cultural/geographic context).

III. CONCISE DESCRIPTION OF THE ARTIFACT: (e.g. style, colors, ornamentation, and motif).

IV. DETAIL:

A. DIMENSIONS OF 1) artifact as a whole, and 2) component pieces.

B. MATERIALS: (material content and structural make-up)

1. Microscopic and microchemical tests. (e.g. TEXTILES: consider 1) fiber identification and morphology, 2) yarn structures, 3) fabric structures, and 4) structures accessory to the fabric; LEATHERS: consider 1) identification of species, 2) evidence of processing; OTHER BIOLOGICAL MATERIALS: appropriate observations on wood, cork, rubber, and any other components from biological sources; MINERAL ACCESSORIES: consider 1) glass, e.g. size and type of manufacture of glass beads, and 2) metals, e.g. beads, eyelets, heel cleats.)

2. References.

C. MANUFACTURE:

1. Techniques (consider 1) stitching in terms of stitch name, stitch number, hand and machine sewing, 2) nails and pegging, 3) ornamentation techniques such as application of beadwork, hair tufting, embroidery, decorative seams, tassel construction.)

2. References

V. FOOTWEAR CLASSIFICATION:

A. FOOTWEAR TYPE: (e.g. moccasin, sandal, saalsko)

B. CONSTRUCTION TYPE: (e.g. welted construction, Hatt's moccasin series)

C. REFERENCES

VI. WEAR MARKS:

A. OBSERVATIONS: (e.g. consider 1) those under the shoe, chiefly the heel and sole, 2) impressions on the inside made by the foot, and 3) signs on the uppers such as crease lines, bulges, splits in the leather.)

B. REFERENCES:

VII. SUMMARY OF COMPLETED DRAWINGS OF FOOTWEAR DETAIL:

Appendix 4

WORKING DEFINITIONS FOR THE STUDY OF HISTORIC ARCTIC FOOTWEAR

ACCESSORY STITCH: sewing stitches that are added to fabrics, as opposed to being a necessary element in construction of the fabric itself.

ANGLE OF TWIST: in the analysis of yarns, the angle of the slant of the twist that is made with the vertical axis of the yarn (see s-twist and z-twist).

ANKLE BAND: a term used in some publications on North American native footwear to denote the tie that encircles the ankle, e.g. the thong-tie on mukluks.

APPLIQUE: decorative applied work of two kinds 1) overlaid -- pattern is produced by shaped sections of accessory fabric which are laid on the face of a complete ground fabric and fastened to it, and 2) underlaid -- the pattern is produced by applying the accessory fabric under the ground fabric from which the pattern areas have been cut.

BACK-STITCH: a single unbroken line of sewing to create a solid line. Of importance in the classification of quill work techniques where the stitch is used to provide structure for attachment of the quills.

BACK-STRAP or STRIP: the strip of leather covering the back-seam of shoe quarters or backs.

BALANCED YARNS: yarns in which the twist is such that the yarn will hang in a loop without kinking, doubling, or twisting on itself.

BALMORAL: a laced shoe in which the quarters meet and the vamp is stitched over the quarters at the front of the throat.

BARK TANNING: the tanning agent used in treatment of the skins has been extracted from the bark of trees.

BAST FIBERS: fibers obtained from the stem structures of plants, e.g. flax (linen), hemp, jute, and nettle.

BEADING: ornamentation technique that results in designs utilizing manufactured beads (see trade beads, lazy stitch, overlaid stitch, spot stitch).

BLANKET CLOTH: a cotton or woollen fabric made of plain or twill weave with the weft yarns heavily napped on both sides.

BLEND: a yarn obtained when two or more types of staple fibers are joined in the textile operation to produce spun yarns.

BLUCHER: a laced shoe in which the quarters extend forward over the vamp and are left loose at the inner edge.

BUTTONHOLE STITCH: (also called BLANKET STITCH) an accessory stitch that is created by simple looping. It may be used to create a straight line or to fill an area in embroidery, as is true with the satin stitch, but it is recognizable because the back side shows a long row of straight vertical stitches. It is commonly used on Athapaskan embroidered footwear.

BRACING: when an upper is lasted onto an insole, the lasting margins have to be held in position until welt or sole is attached. This can be done by nails or by bracing thread criss-crossing and pulling the margins inwards. Although the thread may not survive in shoe artifacts the imprint may be visible.

BRAID: a narrow textile structure formed by plaiting several strands of yarn or other strips of materials.

BRISTLE TECHNIQUE: a method utilizing bundles of hairs to create decorative hair embroidery.

BUCKSKIN: leather from deer or elk skins from which the grain has been removed; it may be finished on the flesh or the grain side.

BUFFALO LEATHER: a term often used for leather made from the hide of domesticated water buffalo of Asia, but in some instances it may refer to the hide of the American bison.

BUSKIN: a boot extending halfway to the knees, laced with cord or ribbon.

BUTTED SEAM: the edges of adjoining upper sections are butted together and joined by a seam, often an edge/flesh one, resulting in the seam being invisible on the reverse side.

CALF LEATHER: made from the skin of cattle up to a few months old, thus, the skins do not weigh more than 15 pounds.

CANVAS: a heavy, rugged, plain weave cloth utilizing from 2 to 14 ply yarns in manufacture. It is also known as Numbered Duck.

CAOUTCHOUC: a term for India rubber.

CARIBOU HIDE: from the genus Rangifer, but in writings it is variously called caribou, deer, and reindeer.

CHAIN STITCH: in commercial footwear manufacture, it is a single thread stitch characterized by the fact that the entire thread may be pulled out when a stitch is cut or broken.

CHAMOIS: a soft leather originally made from the skin of the antelope, but now from the flesh split of sheep or lamb skin from which the grain has been removed. It is tanned by processes involving oxidation of fish or marine oils, sometimes preceded by a formaldehyde process (combination tannage).

CHANNEL: a row of stitching holes, sometimes set in a groove, or, a slanting cut made around the edge of an outsole to provide a groove for stitching and to keep the line of thread below the surface of the leather. Soles stitched in this way are called "channel stitched."

CHROME RETAN: leather tanned first with chromium salts and then retanned with vegetable extracts.

CHROME TANNAGE: tanning with chromium compounds, often distinguishable by a blue-green color visible on cut edges.

CLOG: shoe having a wooden or cork sole and often of a sandal type.

CLOSED (or CLOSE) SEAM: two upper sections are stitched together face to face along an edge and then opened out and flattened.

CLOSING: stitching upper and lower sections of shoe together.

CLUMP (or CLUMP SOLE): a half-sole added to a shoe, usually as a repair.

COATED FABRIC: a fabric to which a surface layer such as resin, rubber, or varnish is added.

COLLAGEN: the principle fibrous protein in the corium or derma layer of a hide or skin.

COMBINATION FABRICS: those that contain two or more different types of fibers. These differ from blends in that any one single yarn in a combination fabric is composed of only one fiber type.

COMBINATION TAN: historically, the term implies a blend of vegetable extracts. More recently, it means tanning with two or more types of tanning materials such as chromium compounds and vegetable extracts or chromium compounds and synthetic tannins.

COMBINATION YARN: a plied yarn in which each single component is composed of one fiber type but at least two different types occur in the final plied yarn.

COMPOSITION: materials composed of granulated fillers such as cork or leather in a resinous matrix, that can be compressed and molded into sheet materials. It is commonly used for insoles and outsoles.

CORE YARN: a yarn in which the base or foundation yarn is completely wrapped by a second yarn (see also HAIR CORE).

CORK: outer bark of the cork oak tree, a material that has many footwear applications.

COTTON: a natural cellulosic fiber derived from the genus Gossypium, a member of the Malvaceae plant family.

COUNTER: a piece of stiffening material inserted between the lining and the outside of a shoe upper at the back of the shoe.

COWHIDE: a term specifically applied to leather made from the hide of cows, although sometimes loosely used to designate any leather tanned from hides of animals of the bovine species.

CREPE RUBBER: originally, unvulcanized natural rubber, with knobbly surface for soles and heels. Now most crepe rubber for shoes is of synthetic elastomers.

CURING: treatment of hides and skins so as to minimize putrefaction and bacterial action, that is, to prepare skins for tanning by green-salting, brining, or drying.

CUTICULAR SCALES: surface scales on hairs and wool useful for identification. Terms used in describing imbricate scales are ovate, acuminate, elongate, crenate. Simple, serrate, and dentate are descriptive terms for coronal scales.

DEGRAINED LEATHERS: the grain has been removed after tanning by splitting, abrading, or other processes.

DELAMINATION: the separation of the layers of leather into grain and flesh layers due to the incomplete penetration of the tanning agent, or, the separation of the layers in a laminate caused by the failure of the adhesive.

DEPILATION: removal of hair from a hide.

DOESKIN: commercial term for white leather from sheep or lambskin, tanned with alum or formaldehyde. Occasionally in the shoe trade the term designates a leather made from deerskin, but then the term is synonymous with buckskin.

DOUBLE WEAVE FABRIC: a fabric woven with two complete sets of warp and weft yarn resulting in two layers of cloth.

DRAWN TUBULAR BEADS: glass trade beads manufactured from drawn tubing with subsequent treatment to round rough edges. Found on native-made footwear.

DRILL: a strong cotton material which has a diagonal 2 x 1 twill running to the left selvage. It may be called "khaki" when dyed that color.

DUFFLE (also spelled DUFFEL): heavy British-made fabric that is napped on both sides, commonly woven in a twill weave. Sometimes the term is used interchangeably with blanket cloth or stroud.

DYES: synthetic or natural organic chemicals that are soluble in most common solvents, characterized by good transparency, high tinctorial strength, and low specific gravity.

EDGE/FLESH SEAM: the stitching holes are pierced from the edge of the section (usually the sole) to the flesh side.

ELASTOMER: a material which stretches under low stress to at least twice its length and snaps back to the original length upon release of stress.

ELK LEATHER: a trade term used to designate chrome-tanned cattlehide that is used for uppers of work shoes and others requiring flexibility and durability. It is "elk-finished" cow hide.

EPIDERMIS: outer layer of skin which is removed along with the hair before tanning.

FELT: a nonwoven fabric in which the fibers develop a tight bond, that is, a massed fiber fabric.

FIBER MORPHOLOGY: the form and structure of a fiber, including its biological structure, shape, cross section, and microscopic appearance.

FIBRILS: bundles of fiber cells.

FISHERMAN'S BOOTS: boots of "mukluk design" made for fishermen in northern Europe of fish or sea mammal skin.

FLANNEL: a catch-all designation for slightly napped fabrics of cotton or wool.

FLAT STITCHES: added accessory stitches of which there are five categories based upon structure. These are: 1) running stitches, 2) overcasting or whipped stitches, 3) straight stitches, 4) solid-line stitches, and 5) crossed stitches.

FLESH: the inner surface of a piece of leather which was originally next to the animal's body; the loose fibers are usually prominent.

FOLLICLES: the structure from which hairs grow. A study of skins includes consideration of the groupings of follicles (primary and secondary) which have characteristic arrangements dependent on the species of the animal.

FOREPART: the front of a shoe, or the front of the sole or insole.

FRENCH CORDING: finishing the top edge of the shoe upper with narrow fabric binding.

FRINGE: a decorative edge finish made by cutting the fabric or leather in narrow strips or by adding accessory ornamentation that hangs in vertical strips from the edge.

FULL GRAIN: having the original grain surface left on the skin.

GOODYEAR WELT: a commonly used type of shoe construction where a hidden chain-stitched in-seam holds together the upper, welt, insole, and lining and a lock-stitched out-seam attaches the out-sole to the welt.

GORE: the insert in an opened seam to provide ease in fit.

GORING: a woven fabric with rubber threads forming an elastic material that is used as an insert in footwear.

GRAIN: the outer side of a hide or skin, including hair follicles.

GRAINED LEATHER: a leather where the original natural grain has been altered.

GUARD HAIRS: the hairs in the outer coat of a mammal that arise from primary hair follicles and may be spines (such as quills), bristles, or awns. They are used in the classification of furs.

HAIR COIL: a bunch of hair, commonly horse hair, of sufficient size to use as a foundation or filler for wrapping by quills or hair in horse hair embroidery. This is commonly found in Athapaskan footwear.

HAIR EMBROIDERY: a decorative technique utilizing quills, moose, caribou, or horse hair.

HEEL: the rear part of a shoe bottom that is commonly measured in eighths of an inch and usually projects below the level of the sole.

HEEL BASE: the part of the heel next to the sole.

HEEL BREAST: the forward face of the heel, commonly concave towards the shank.

HEEL FLAP: the piece of leather found in some native-styled moccasins which trails from the base of the heel. It serves no constructional purpose but may be used to identify the tracks of the wearer.

HEEL LIFT: a single layer forming part of a built-up heel.

HEEL SEAT: the part of the sole or shoe upper to which the heel is attached.

HEMP: a bast fiber derived from a plant in the Moraceae family. It is not to be confused with "false hemp," a name given to various plants used in Native American footwear.

HIDE: the pelt of a large animal.

HORSE HAIR PIPING: a term for the coil wrapped ornamentation placed around the vamp in some native-styled moccasins.

HUDSKO: A Danish term for a hide shoe that does not have a separate sole.

INSOLE: the inside bottom part of a shoe upon which the foot rests.

INSOLE RIB: a strip of canvas cemented to the lower side of the insole forming a ridge to which the upper and welt can be attached.

INSTEP: used synonamously by some publications with vamp and tongue in descriptions of native-made moccasins.

JERSEY: an elastic knitted fabric made in a stocking knit stitch.

JUTE: a bast fiber.

KAMIK: a name for Inuit footwear in the eastern Arctic; in the western Arctic the term mukluks would be used more frequently.

KEMP: wool or hair fibers found in the fur of many animals. These are usually white and rather coarse.

KID: leather made from goat skins.

KIP: skin, from a bovine animals, weighing between 15 and 35 pounds in green-salted condition.

KNIT FABRIC: a one element fabric structure made by interlooping yarns which is commonly found used for the construction of stockings.

LAPPED SEAM: in footwear construction, two upper sections are overlapped and stitched together right through the full substance of both sections.

LAST: a block on which a shoe is made. It roughly corresponds to the shape of the foot.

LASTING MARGIN: the lower edge of the shoe upper which is turned under and fixed to the insole or sole during the shaping of the upper to the last.

LATEX: the liquid that comes from rubber trees.

LAZY STITCH: a method for attaching bead ornamentation to footwear by stringing a number of beads on a thread, taking a stitch, stringing more beads, taking a stitch, etc. This building up of rows creates a distinctive ribbed effect and a motif that is usually geometric rather than curvilinear.

LEGGINGS: footless clothing for the legs, of variable length but never extending above the crotch.

LINEN: yarn or fabric made from fibers of the flax plant.

LOCK STITCH: a double-thread stitch that locks the threads together within the material so that when one stitch is broken the seam can not be ravelled out.

LOOP STITCH: an accessory stitch that commonly is added to native-made footwear to provide structure for the attachment of quills and is of importance in the classification of quill work techniques.

MANDREL WOUND BEADS: glass trade beads made by wrapping glass at the melting point around a rotating tapered iron mandrel.

MEDULLA: the central region of a hair that is used as a morphological character in hair identification. The types are classified as discontinuous, continuous, fragmented, and absent.

MIDSOLE: a sole placed between the outsole and the insole.

MINERAL TANNED: tanned with compounds of mineral origin, without the use of vegetable tanning materials.

MOCCASIN: footwear often characterized by a single piece of leather for the vamp that also extends under the foot, however, many types of construction are possible (see Appendix 5). North American usage often implies that a moccasin, by definition, is native-made but English terminology commonly uses the term for easy fitting footwear as opposed to fitted leather boots.

MOCCASIN-BOOTS: a classification term for footwear, such as knee-high moccasins, which appear to have evolved from a combination of moccasins and leggings.

MOOSE SKIN: in America this term is used only for skins from the genus Alces, but in European writings Alces may be called either moose or elk.

MUKLUK: footwear commonly associated with Inuit peoples for cold, dry weather. However, the term does not necessarily imply that it is native-made since cold weather military wear also is commonly called moccasins or mukluks.

MULTICOMPONENT FABRIC: a fabric in which a minimum of two layers of material are sealed together by an adhesive.

MUSLIN: a generic term for a wide variety of plain weave cotton fabrics.

NAILED CONSTRUCTION: a method of shoemaking in which the upper is nailed to the bottom, the lasting margin being sandwiched between sole and insole.

NAP: fibers raised on the surface of the fabric by mechanical means.

OAK TANNAGE: originally, a tannage done entirely with oak bark; now, it is a term loosely applied to any tannage of heavy leather with vegetable extracts.

OIL CLOTH: fabric which originally was treated with linseed-oil varnish or other oils to give a waterproof quality. Now it may refer to plasticized fabric.

OVERCASTING (or WHIPPING) STITCH: a kind of flat stitch taken over the edge of the fabric in which the needle repeatedly emerges from the material on the working face and enters from the reverse so that each stitch passes over the edge leaving part of the thread on one side and part on the other.

OVERLAID STITCH: a stitch used when covering the surface with beadwork where the beads are strung on a thread, laid in position and, with a second thread, a stitch is made at intervals over this thread, attaching it to the material. This is sometimes also called the overlay stitch, the spot stitch, or the squaw stitch in the literature.

PAMPOOTIE: simple, one-piece footwear, used until recently in certain areas of Europe and the British Isles. It is made of a piece of rawhide that is bent up around the foot and held on by a lace put through a series of holes near the rim.

PATENT LEATHER: leather with a high gloss finish.

PELT: a raw skin derived from fur animals.

PIGSKIN: leather made from the skin of pigs which is characterized by a three-hole pattern left by the primary and secondary follicles.

PILE: a surface effect of raised yarns of cut or uncut yarn loops that project from a foundation fabric.

PILE WEAVE: a compound weave that has an extra warp or weft that forms the loops in a pile fabric.

PLAITING: a single element textile structure made by interlinking and which is commonly found in quill work ornamentation and in the construction of laces.

PLY: twisting together of two or more strands in the formation of yarn, or, one or more layers bonded together to form a laminated sheet as in stacked heels.

PRE-WELT: a type of shoe construction in which the upper and welt are joined by a chain stitch seam, the insole and the upper are cemented together and the outsole is lock-stitched to the welt.

QUARTERS: the sides of a shoe upper joining on the the vamp at the front and meeting each other at the back of the heel. If there is a seam here it is called the BACKSEAM.

QUILL WORK: decorative technique utilizing procupine (Erethizon sp.) or quills from various birds.

RAND: a strip of leather used around the edge of a heel at the base to fill the gap between heel and sole. It is shaped on the inside to a thin edge.

RAWHIDE: hide that has been dehaired but not tanned. Sometimes in literature on native poeples this is called BABICHE.

RUBBER: term that applies to any of a large number of natural and synthetic elastomeric compounds.

S-TWIST: a designation for that direction of twist in yarn which is similar to the central portion of the letter S.

SAALSKO: a Danish term for footwear consisting of two main components, an upper and a sole, which are joined along the lower edge of the foot.

SADDLE: in a shoe, the piece of upper material that extends from the top of the vamp and upward to the top of the quarter of both sides.

SANDAL: footwear in which a sole is fastened to the foot by straps or thongs either by 1) a toe string which goes between two toes or by 2) a lace which runs through holes or loops on the sides.

SANDAL-BOOT: a classification category for footwear such as the mukluk which appears to be a combined form of sandal and fur stocking.

SATEEN: a simple weave fabric which has floats running in the weft direction.

SATIN STITCH: a simple, straight accessory stitch used to cover surface areas in embroidery. Its identifying characteristic is that both sides are identical; if both sides are not identical the stitch is called a FALSE SATIN STITCH.

SATIN WEAVE: a simple weave characterized by floats running in the warp direction.

SEAM: the line of joining of two edges, in footwear the pieces are most commonly joined by sewing together.

SEAT (or HEEL SEAT): the rear end of insole or sole in which the heel of the foot rests.

SELVAGE: the side edge of woven fabric. It must be examined in order to establish which is the warp and which is the weft in a textile fragment.

SHANK: a reinforcement placed centrally between the lasting margins of the waist of a shoe and between sole and insole to prevent the shoe from bending at the waist.

SIDE FLAPS (or ANKLE FLAPS): the pieces found on some moccasins that hang down on the sides from the upper and footpiece seam, or, the portion of the upper piece that is turned down to create a flap.

SILK: a continuous filament protein fiber that is formed by the silk worm or other insect larvae.

SINGLES: a one-ply yarn made of staple fibers.

SINEW: fibers extracted from large tendons of buffalo, caribou, deer, horses, etc., that are dried and pounded to separate into "threads" for use in sewing.

SISAL: bast fibers obtained from the leaves of the agave plant.

SMOKE CURE: an important aspect of the "tanning process" used by natives in preparing skins for footwear manufacture.

SOCK: a short foot covering worn inside the shoe, or, a piece of material attached inside a shoe to cover the insole so as to cover nail points or stitches and to carry the maker's name and trade mark. This may also be called the SOCK LINING.

SPATS: a kind of cloth gaitor reaching a little above the ankle and not covering the bottom of the foot.

SPOT STITCHES: a type of accessory stitch used to provide structure for the attachemnt of quills; its presence is of importance in the classification of quill work technique. The spot stitch is also a name for the overlaid stitch in beadwork.

STAPLE FIBERS: short fibers no longer than several inches (as contrasted to FILAMENT FIBERS which can be measured in meters or miles).

STITCH LENGTH: the distance between the stitches or stitch holes in a stitching row.

STRAIGHTS: a term applied to shoes which are not made for the left or right foot but can be worn on either foot.

STROUD or STROUDING: now often used interchangeably for duffel (also spelled duffle) cloth, stroud, and blanket cloth, but, more correctly, a fabric that was woven in England especially for trade to North American natives. Today, Melton cloth is often used in place of stroud by native and non-native craftpersons.

T-SEAM: a descriptive term for the shape of the seam that is commonly found at the toe or heel of moccasins. Its presence or absence is of importance in stylistic classification.

TARPAULIN: canvas fabric coated to make it waterproof.

THROAT: the central portion of the rear end of the vamp resting on the instep of the foot.

THREAD: a specialized type of yarn made specifically for purposes such as sewing, basting, and embroidery work.

TICKING: a heavy twill fabric made with a colored yarn stripe in the warp.

TIE-HOLES: the holes in quarters, or the tongue through which a string, ribbon or thong is passed to hold the shoe on the foot.

TOE-PUFF: a reinforcement under the toe-end of the vamp.

TOE-SPRING: the elevation of the toe-end of a shoe sole above the horizontal surface on which a shoe is standing.

TONGUE: a backwards extension from the vamp throat resting on the instep of the foot. Occasionally, the term "tongue" is used in the literature to indicate the vamp or instep when describing native-styled moccasins.

TOP BAND or TOP LIFT: the bottom section of a heel which actually rests on the ground.

TOP GRAIN: the first cut taken from the grain side of a split hide from which nothing except the hair and epidermis have been removed.

TRAILORS: a term used for the protruding leather pieces that drag behind on some native-styled moccasins.

TREAD: the widest part of the sole forepart which is in closest contact with the ground.

TRADE BEADS: beads commonly used to decorate native footwear. They are analyzed on the basis of 1) material that they are constructed from, 2) method of manufacture, 3) color, and 4) size.

TRADE MARK: a symbol used in connection with merchandise alluding to origin or ownership of the product.

TUNNEL STITCH: a seam used in repairing footwear to attach a new piece of leather on top of an old one. The holes enter the surface of each piece, pass for a short distance between grain and flesh, and then reappear on the same side. This is also sometimes called the CATEPILLAR STITCH.

TURN SHOE: a single-sole, flexible shoe in which the sole and upper are stitched together with a horizontal chain stitch while wrong sideout on the last.

TURN-WELT: a turn shoe which has an extra wide rand included in the seam so that this becomes a welt to which a first sole, and later, a repair sole, can be stitched.

TWILL WEAVE: a simple weave in which the yarns are interlaced in such a way that pronounced diagonal lines are observed. The angle of the diagonal line and whether the floats are right-hand or left-hand in structure are used in description of a twill.

TWIST: the direction of the spiral in a spun yarn (S or Z).

UNDERHAIR: the hairs on a skin that arise from secondary follicles. This is important in the classification and identification of furs and hides.

UPPER: the portion of a shoe which covers the top of the foot. However, when referring to native-made footwear this would more often be referred to as the vamp or instep.

UPPER PIECE: in classification of moccasins, this is the rectangular piece that begins at the top of the foot and circles around the leg.

VAMP: the front section of a shoe upper covering the toes and part of the instep in European-styled footwear, but commonly used interchangeably with instep (and sometimes tongue) in descriptions of native-made footwear.

VAMP WINGS: the sides of the vamp extending backwards on either side of the throat to join the quarters.

VEGETABLE TANNING: the conversion of raw hides into leather by treating with water solutions of tannin extracted from materials of vegetable origin.

VELTSHOEN: a shoe in which the upper is turned outwards round its bottom edge to form a flange which is then stitched to a sole or middle sole.

WAIST: the narrow part of a shoe sole or insole under the arch of the foot, which is also called the waist.

WALLED TOE: a shoe forepart which rises vertically from the sole margin and then turns sharply across to the opposite side. It is often found in conjunction with an apron front.

WARP: in woven fabrics, the yarns that run parallel to the selvage edge.

WEDGE HEEL: a heel extending under the waist of the shoe to the forepart.

WEFT: in woven fabrics, the yarns that run perpendicular to the selvage edge. Sometimes the term FILLING or WOOF is used instead of weft.

WELLINGTON: a knee-length boot, nowadays in American terminology it usually refers to a leather boot, but in England it more often refers to a rubber boot.

WELT: the strip of leather between the upper and the sole to which each part is in turn attached.

WELTED CONSTRUCTION: a method of shoe construction that takes place in three stages: 1) the upper is lasted and held in position by nails or bracing thread, 2) the lasted upper is sewn together with a welt, and 3) the sole is then attached to this welt.

WOOL: commonly used to refer to the fibers that come from sheep, but it also refers to fibers from other fleece animals such as the Angora goat, camel, alpaca, llama, and rabbit.

WORSTED YARN: a smooth yarn made from long-stapled, evenly combed wool fibers.

WRAPPING: the interworking relationship of a warp and weft where one element serves as a core and another repeatedly encircles it in a forward movement.

YARN: a continuous strand of textile fibers in a form suitable for fabric formation.

Z-TWIST: the spirals in a yarn slope to the central portion of the letter Z.

Appendix 5

DIFFERENTIATION OF NATIVE AMERICAN MOCCASIN TYPES (from Hatt, 1976)

Series 1: one piece construction, straight heel seam and toe seam.

Series 2: one piece construction, T-shaped heel seam and straight toe seam.

Series 3: one piece construction, straight heel seam and T-shaped toe seam.

Series 4: one piece construction, with T-shaped heel seam and T-shaped toe seam.

Series 5: made of more than one piece, the bottom having a straight heel seam and straight toe seam.

Series 6: made of more than one piece, the bottom having a T-shaped heel seam and straight toe seam.

Series 7: made of more than one piece, the bottom having a straight heel seam and T-shaped toe seam.

Series 8: made of more than one piece, the bottom having a T-shaped heel seam and T-shaped toe seam.

Series 9: made of more than one piece, the bottom having a straight heel seam and no toe seam, being bent up over the end of the foot and sewn to the tongue with more or less puckering, with the tongue narrow or gore-like.

Series 10: made of more than one piece, the bottom having a straight heel seam and no toe seam, being bent up over the end of the foot and sewn to the tongue or instep piece with more or less puckering, the instep piece being of medium size.

Series 11: made of more than one piece, the bottom having a T-shaped heel seam, the upper instep piece being so large as to cover the whole top of the foot.

Series 12: made of more than one piece, having a T-shaped heel seam and a side seam which runs from a point near the middle of the heel seam, along the outer side of the foot and around the toe.

Series 13: the shoes consist of a flat sole and upper piece, with vertical heel seam, the opening for the instep is cut as a straight slit, and--in most forms--

a special instep piece, gore-like, is sewn into the foremost part of the slit.

Series 14: shoes consist of flat sole and upper piece, with a vertical heel seam, the opening for the instep is cut as a T, the instep piece is then sewn to the transverse part of the cut.

Series 15: shoes consist of a flat sole and upper piece, with vertical heel seam, the opening for the instep is cut as a Y or as two parallel lines, the triangular or rectangular tongue serving as a special instep piece. In some cases a special top piece is added.

Series 16: the shoe is made of one piece, with a middle seam running on the underside, from the toe right through to the heel and then continued as a straight heel seam.

Series 17: shoes consist of a sole with a turned up rim, and instep and top pieces which are sewn to the sole, but not connected with each other by a seam.

Series 18: shoes consist of a sole with turned up rim, and upper generally of one piece. In some cases the anterior part of the foot is covered with a special piece, connected with the rest of the upper by a transverse seam.

Series 19: shoes consist of sole with turned up rim, upper, top, and eventually, an instep piece.

Series 20: Eskimo boots and shoes--sole is turned up all along the rim, with more or less puckering, before and behind, generally with ankle band (thong tie) fastened in the sole seam or passing through loops fastened in the sole seam.

Series 21: shoes of leg hide, the natural shape of the hide being utilized.

Appendix 6

VALUE LABELS AND CODED DATA

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TYPEDOC (1)WRITTEN (2)VISUAL (3)ARTIFACT/
LOCDOC (1)BOREAL INST-EDM (2)UNIVALTALIBRARY
(3)UNIVALTAARCHIVES (4)ALTAPROVMUSEUM
(5)INSTSEDPETGEOL-CALG (6)ARCTICINST-CALGARY
(7)GLENBOW-CALGARY (8)SCOTTPOLARRESINST
(9)NATMARMUS-GREENWICH (10)KENDALLWHALINGMUS
(11)STEFCOLL-DARTMOUTH (12)PEARY-MACM-BOWDOIN
(13)ODHS-NEW BEDFORD (14)MARMUSEUM-SEARSPORT
(15)PRIVATE COLLECTION (16)UNIV ALTA-ANTHRO
(17)STRATHCONA CO LIB (18)PUB.ARCH.CAN
(19)UBC-MUS.ANTHRO (20)RCMP HDQS-OTTAWA/
DOCSORC1, DOCSORC2 (1)UNPUB PERS PAPERS
(2)PUBLISHED NARRATIVE (3)OFFICIAL PROCEEDINGS
(4)POPULARIZED BOOK (5)MAGAZINE-NEWSPAPER
(6)UNMODIFIED DRAWING (7)2ND PERSON ENGRAVING
(8)PAINTING ON LOCATION (9)2ND PERSON PAINTING
(10)PHOTOGRAPH ON LOCATION (11)ACCESSION PHOTOGRAPH
(12)ACCESSION DESCRIPTION (13)STORED ARTIFACT
(14)DISPLAYED ARTIFACT (15)ARTIFACT FRAGMENT
(16)ARCTIC BLUEBOOKS
(17)EQUIPMENT LIST (18)2ND PERSON AUTHOR
(19)PUBLISHED DIARY (20)TRANSLATION (21)PUBLISHED LETTER
(22)PERSONAL COMMUNICATION (23)PUBLISHED PICTURES
(24)COLORED LITHOGRAPHY (25)DISPLAYED ART WORK
(26)OFFICIAL REPORT (27)WRITTEN ORDERS
(28)PHOTO CAPTION (29)SUPPLY ORDERS
(30)RECOMMENDATIONS/
SHOETITL, GARFEET1, GARFEET2, GARFEET3, GARFEET4
(1)BOOT (2)SHOE (3)SANDAL (4)SLIPPER
(5)CLOG (6)OVERSHOE (7)MUKLUK-SANDAL BOOTS
(8)MOCCASIN (9)MOCCASIN-BOOT (10)INNER BOOT (11)
SOCK.1 (12)BLANKET WRAPPER (13)INNER SOLE (14)LEGGINGS
(15)SPATS
(16)FLANNEL SQUARE (17)BOOTHOSE
(18)BLANKET SOCKS (19)STOCKINGS
(20)SOCKS.2 (21)FINNESKO (22)"SEN NEGROES"
(23)BED SHOES (24)KAMIKS (25)NATIVE BOOTS
(26)LEATHER FRAGMENT (27)1 PIECE TROUS&BOOTS
(28)HEELED STOCKINGS (29)CANVAS BOOTS
(30)TRAVELLING BOOTS
(31)ELASTIC SOCKS (32) MILLED HOSE
(33)FISHERMAN'S BOOTS (34)SPARE SOLES (35)SPARE HEELS
(36)SNOW BOOTS (37)BOOT HOSE (38)WRAPPERS
(39)SEA BOOTS (40)CARPET BOOTS (41)HALF BOOTS
(42)INDIAN STOCKINGS (43)BUSKINS
(44)BOX CLOTH BOOTS (45)STOGA BOOTS (46)KIP BOOTS
(47)GAITORS (48)SHOE TACKS (49)WHITE LEAD-WATER PRF
(50)CANADIAN MOC (51)WAXED ENDS (52)HBC MOCCASINS
(53)BOOTHOSE-LEATH FOOT (54)ESKIMO BOOTS
(55)COMPOSITION-WATER PRF (56)SEAL SKIN
(57)LINING (58)SOLE FRAGMENT
(59)BOOT CLEATS (60)KNIT FRAGMENT (61)CLOTH FRAGMENT
(62)JAEGER SOCKS (63)SKIN BOOTS (64)BOOT PACKING
(65)SLEEPING SOCKS (66)JAEGER STOCKINGS (67)SENNA GRASS
(68)LAPP BOOTS (69)FINN SCHU
(70)LAPP SHOE (71)NORWEGIAN KOMAGER
(72)HUNTING BOOTS (73)WADS (74)JAEGER SLIPPERS
(75)GERMAN STOCKINGS (76)SAMOYEDE BOOTS
(77)MUKLUK LINERS (78)LONG BOOTS (79)SHORT BOOTS
(80)GREASE (81)WATER MUKLUKS (82)DUFFELS
(83)WADERS (84)SKI SOCKS (85)SLIPPER SOCKS
(86)BUXTON SLIPPERS (87)FELT WELLINGTONS
(88)FOOT NIP (89)HAY (90)INDIAN SHOES
(91)ESKIMO SHOES (92)FEARNOUGH BOOTS
(93)GREENLAND BOOTS/
YEAR (998)NOT ASCERTAINED (999)UNDETERMINABLE/
YRACCUR (1)ACCURATE (2)ESTIMATE (7)NOT RELEVANT/
MONTH (1)JANUARY (2)FEBRUARY (3)MARCH
(4)APRIL (5)MAY (6)JUNE (7)JULY
(8)AUGUST (9)SEPTEMBER (10)OCTOBER
(11)NOVEMBER (12)DECEMBER (98)NOT ASCERTAINED
(99)UNDETERMINABLE/
DAY (98)NOT ASCERTAINED (99)UNDETERMINABLE/
EXPEDLOC, OVERWINT, MANUFLOC (1)SMITH SOUND (2)ELLESMERE ISLAND
(3)HELL GATE (4)DEVON ISLAND (5)BYLOT ISLAND
(6)LANCASTER SOUND (7)POND INLET
(8)FURY & HECLA STRAIT
(9)GULF OF BOOTHIA (10)BOOTHIA PENINSULA (11)KING
WILLIAM ISLAND (12)SOMERSET ISLAND (13)BATHURSTISLAND
(15)AXEL HEIBERG ISLAND (16)SVERDRUP ISLANDS
(17)BEECHEY ISLAND (18)VISCOUNT MELVILLE SD
(19)MELVILLE ISLAND (20)MCCLINTOCK CHANNEL
(21)VICTORIA ISLAND (22)BATHURST INLET
(23)CORNATION GULF (24)COPPERMINE RIVER
(25)GREAT BEAR LAKE (26)AMUNDSEN GULF
(27)MACKENZIE RIVER (28)BANKS ISLAND
(29)MACKENZIE DELTA (30) YUKON
(31)HERSCHEL ISLAND (32)PEEL RIVER
(33)GREENLAND (34)ARCTC OCEAN
(35)HUDSON STRAIT (36)FROBISHER BAY
(37)STARVATION (38)DEALY ISLAND
(39)CUMBERLAND HOUSE (40)FORT PROVIDENCE
(41)JAN MAYEN LAND (42)NORTHUMBERLAND SOUND
(43)ENGLAND
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ONLY COPY AVAILABLE
SEULE COPIE DISPONIBLE

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(44)POLAR SEA (45)NORTH POLE
(46)FLAXMAN ISLAND (47)WRANGEL ISLAND
(48)SIBERIA (49)HUDSON STRAIT (50)FULLERTON
(51)FRANZ JOSEF LAND (52)U.S.A.
(53)NEW YORK CITY
(54)PETERAVIK,GN (55)FORT RAE-BARREN LD (56)SOUTHAMPTON IS
(56)ALASKA (57)GREAT SLAVE LAKE
(58)BAKER LAKE (59)EASTERN CANADA
(60)ATLANTIC OCEAN (61)NFLD (62)CHURCHILL
(63)CORNWALLIS IS
(94)NATIVE ON SHIP
(95)NATIVE COMMUNITY (96)ON SHIPBOARD
(98)NOT ASCERTAINED
(99)UNDETERMINABLE/
LATITUDE, LONGITUD (98)NOT ASCERTAINED
(99)UNDETERMINABLE/
CLOUDCOV (1)CLOUD COVERED (2)PARTIAL CLOUD COVER
(0)CLEAR (8)NOT ASCERTAINED (9)UNDETERMINABLE/
ZERO (1)ABOVE 0 F. (2)BELOW 0 F.
(8)NOT ASCERTAINED (9)UNDETERMINABLE/
TEMP (96)96 F. OR HIGHER (98)NOT ASCERTAINED
(99)UNDETERMINABLE/
WINDVEL (96)96 MPH OR HIGHER (98)NOT ASCERTAINED
(99)UNDETERMINABLE (97)INDOORS-NOT RELEVANT/
QUALWIND (1)STILL (2)LIGHT (3)MODERATE
(4)STRONG (5)GALE (6)NO COMMENT-ASSUME NIL (7)NOT RELEVANT
(8)NOT ASCERTAINED (9)UNDETERMINABLE/
SNODRIFT (0)NO DRIFT (1)LOW DRIFT
(2)LOW AND HIGH DRIFT (3)HIGH DRIFT ALL DAY
(6)NO COMMENT-ASSUME NIL
(7)NOT RELEVENT
(8)NOT ASCERTAINED (9)UNDETERMINABLE/
TRAVELME (1)WALKING (2)SNOWSHOES-SKIIS (3)SNOW MACHINE
(4)CANOE (5)KAYAK (6)SMALL BOAT (7)WHALE BOAT
(8)SHIP (97)NOT RELEVANT (98)NOT ASCERTAINED
(9)SLEDGE -HAULER UNIG
(10)MANHAULED SLEDGE (11)DOG PULLED SLEDGE
(12)SLEDGE-BOAT (13)WINTER QUARTERS
(14)ICE FLOW CAMP (15)PONY SLEDGE
(16)PERM SUMMER CAMP
(17)SAIL-SLEDGE-DOGS
(99)UNDETERMINABLE/
NO.MONTH (98)NOT ASCERTAINED (99)UNDETERMINABLE/
DBARKPT1, DBARKPT2 (1)SOUTH ENGLAND (2)NORTH ENGLAND
(3)SCOTLAND (4)NEW ENGLAND (5)NEW YORK
(6)CALIFORNIA (7)SEATTLE (8)HAWAII (9)OTHER U.S.
(10)MARITIME CANADA (11)MONTREAL (12)HUDSON'S BAY
(13)EDMONTON (14)VANCOUVER (15)OTHER CANADA
(16)HOLSTEINBORG (17)DISKO BAY (18)OTHER-GREENLAND
(19)FROM HBC STORE (20)ST JOHN'S,NFLD
(21)FROBISHER BAY (22)ORKNEYS
(23)ETAH-GNLD
(24)VICTORIA (25)NOME
 (26)NORWAY
(27)FORT RAE (28)WHITEHORSE (29)UNALASKA
(30)HERSCHEL IS (31)CHURCHILL (32)FT CONFIDENCE
(98)NOT ASCERTAINED (99)UNDETERMINABLE/
SPONORG (1)BRITISH ADMIRALTY (2)HUDSON'S BAY COMPANY
(3)ALASKA COMMERCIAL CO (4)NOAMERCOMMCOMPANY
(5)EAST INDIA COMPANY (6)NORTHWEST COMPANY
(7)NATIONAL GEOG SOC (8)U.S.NAVY (9)
 AMER MUSEUM (10)AMER UNIVERSITY
 (11)U.S.GEOLSURVEY (12)CANADIAN MUSEUM
 (13)CANADIAN UNIVERSITY (14)CAN FISH-WILDLIFE
 (15)NWMOUNTED POLICE (16)CATHOLIC CHURCH
 (17)ANGLICAN CHURCH (18)MORAVIAN CHURCH
 (19)OTHER CHURCH (20)PRIVATE INDIV-ENG (21)PRIVATE
 INDIV-AMER (22)PRIVATE INDIV-CAN (23)AMER GOV
 (24)PEARY ARCTIC CLUB (25)CANADIAN GOV (26)RCMP
 (27)U.S.ARMY (28)BRIT ROYAL ARTILLARY
 (29)WM.STEVENSON-DUNDEE (30)CAN.GEOL.SUR/
REASON1, REASON2 (1)GEOGRAPHIC STUDIES (2)FRANKLIN
SEARCH (3)COMMERCIAL TRADE (4)COMM.FISH-WHALE-SEAL
(5)NAT SCIENCE STUDIES (6)ANTHRO STUDIES
(9)RELIGIOUS ACTIVITY (10)JOURNALISM
(11)FOOD OBTAINMENT (12)PERSONAL TRADE (13)VISITING
(14)MANHUNT
(15)ILLEGAL ESCAPE
(16)NW PASSAGE SEARCH (17)REACH NORTH POLE
(18)CACHED SUPPLIES (19)PATROL CAN. WATERS
(20)CUSTOMS REGULATION
(21)MEET RELIEF (22)GEOLOGICAL STUDIES
(23)MAGNETISM STUDIES (24)MISSION ESTABLISHMENT
(97)NOT RELEVANT/
EXPEDITER (0)NONE (1)HUDSON'S BAY CO.
(2)IN HONOLULU (3)NAVAL STORES
(4)NORTH WEST COMPANY (5)HUNT'S NFLD
(6)HUNT & HENLEY (7)HOGARTH ET AL
(8)PERSONAL RESPONSIBILITY
(9)JAEGER-MONTREAL (10)GORBRIDGE-OTTAWA
(11)NWM (12)ALASKA FUR CO (13)QUARTERMASTER-U.S.
(98)NOT ASCERTAINED (99)UNDETERMINABLE/
NATIVES1, NATIVES2 (0)NATIVES ABSENT (1)SMITH SOUND ESKIMO
(2)CENTRAL ESKIMO (3)CARIBOU ESKIMO (4)IGLULIK ESKIMO
(5)COPPERMINE ESKIMO (6)CHIPEWYAN (7)CREE
(8)DENE (9)ATHABASCAN
(10)LOUCHIEUX (11)HARE
(12)SEKOSELOR INUIT (13)BOIS BRULEE
(14)COPPER INDIAN (15)DANISH HALF-BREED
(16)AIVILLIK ESK (17)KENIPITU ESK
(18)DOG RIB (19)YELLOWKNIFE RIV IND
(20)COPPER ESK
(21)VOYAGEURS (22)CARIBOU ESK
(90)GREENLAND ESKIMO
(90)SIBERIAN
(91)EASTERN INDIAN (92)EASTERN ESKIMO
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POOR PRINT
Epreuve illisible

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(93)WESTERN INDIAN (94)WESTERN ESKIMO (95)NATIVES PRES
(96)NOT RECOGNIZED BY PARTY
(97)NOT RELEVANT
(98)NOT ASCERTAINED (99)UNDETERMINABLE/
NUMPRES (0)NONE (1)ONE TO FIVE (2)FIVE TO TEN
(3)10 TO 20 (4)20 TO 50 (5)50 TO 100
(6)OVER 100
(8)NOT ASCERTAINED (9)UNDETERMINABLE/
 NAMEWEAR (1) NARES-75-76
 (2)ROSSPARRY1818 (3)PARRYLYON21-23
 (4)FRANKRICHBACK25-27 (5)ROSS30-31
 (6)BACK36-37 (7)DEASE-SIMPSON37-39
 (8)BELLHBC40-41
 (9)BELL1842 (10)BELL1839 (11)PENNY1838
 (12)PRUDENLEW1843 (13)BELLHBC45
 (14)FRANKLINCROZ45-48 (15)RAEHBC
 (16)PENNY1847 (17)RICHARDSONRAEBELL
 (18)ROSSBIRD48-49 (19)MCCLINTOCKALDOSSOO
 (20)AUSTIN50-51 (21)BALDWINZIEGLER1901
 (22)ANGLO-AMERPOLAR06-08 (23)M'CLURE-INVESTIGATOR
 (24)PULLEN-1849 (25)COOKFRANBART-07-08
 (26)KANE 53-55 (27)FRANKLIN 19-20
 (28)HALL 1860 (29)BACK 33-35 (30)HALL 71-72
 (31)GREELY PARTY (32)MCCLINTOCK-1857
 (33)BELCHER-1852
 (34)STEF-JENNESS (35)LEFFINGWELL
 (36)KELLETT-1854 (37)WOOTTON-NARES-75-76
 (38)FRANKLIN-HOOD 19-21 (39)POLARIS 1888
 (40)PEARY 1909 (41)UNID WHALERS (42)MACMILLAN 1908
 (43)BELCHER-NO DATE (44)MCCLINTOCK 52-54
 (45)HENSON-09-PEARY EX (46)WARDWELL-09-P EX
 (47)MACMILLAN-09-P EX (48)GOODSELL-09-P EX
 (49)MCKINLAY-KARLUK (50)KARLUK CREW 13-14
 (51)WILLIAMS-KARLUK (52)HADLEY-KARLUK
 (53)CHAFE-KARLUK (54)BARTLETT-KARLUK
 (55)PETITOT (60)LOW 03-04
 (61)ZIEGLERPOLAR 03-05 (62)MOULTON-ZIEGLER.03-05
 (63)HARTT-ZIEGLER 03-05 (64)MACKIERNAN-ZIEG-05
 (65)PORTER-ZIEGLER, 03-05
 (66)HANS CHRISTIAN-53-55 (67)F.RUSSELL
 (68)CAPT. PEDERSEN (69)ANDERSON-STEF.EX
 (70)COTTLE-BELVEDERE (71)GUMAER-CAN.ARC.EX
 (72)STORKERSON-CAN.ARC.EX (73)MAGIK-CAN.ARC.EX
 (75)G.M.DOUGLAS (76)WHALER ERA CREW (77)J.R.COX-CAN.ARC.EX
 (78)RNWMP PERSONEL (79)BANES-RNWMP
 (80)JEANETTE EXP
 (81)BRAINARD-GREELY EX (82)RALSTON-GREELY EX
 (83)LINN-GREELY EX (84)SALOR-GREELY EX
 (85)FREDERICK-GREELY EX (86)CONNELL-GREELY EX
 (87)WHISLER-GREELY EX (88)BIEDERICK-GREELY EX
 (89)J.H.LEFROY (90)WHALER AURORA CREW
 (91)LINDSAY-AURORA (92)ARMITAGE-CORNWALLIS
 (93)F.JOHNSON-STEF.EX (94)J.B.TYRRELL
 (95)TAYLOR-ROSS EX-1830 (96)RAE-1850
 (97)G.M.DOUGLAS (98)FATHER ROUVIER
 (99)SHIP ENTERPRISE-1850/
NATIONAL (1)ENG.-SCOT.-IRISH (2)EUROPEAN (3)U.S.A.
 (4)CANADIAN (5)RUSSIAN (6)OTHER/
RACE (1)CAUCASION (2)NEW WORLD BLACK (3)N.AMERINDIAN
 (5)INUIT
 (6)OTHER/
 OCCUPAT (1)BRITISH NAVAL (2)WHALING
 (3)JOURNALIST (4)ANTHROPOLOGIST
 (5)GEOLOGIST (6)GEOGRAPHER
 (7)BIOLOGIST (8)ADVENTURER (9)MISSIONARY(10)U.S. NAVAL
 (11)SHIP CREW
 (12)RNWMP (13)FRENCH MARINE
 (14)UNIVERSITY (15)DOCTOR
 (16)MATHEMATICIAN (17)SHIP CAPTAIN
 (18)SCIENTIST (19)U.S. CALVARY
 (20)HUNTER (21)ENGINEER
 (98)GROUP-VARIED OCCUPAT/
RANK (1)CAPTAIN (2)LIEUTENENT (3)PURSER
 (4)SURVEYOR (5)SURGEON (6)GUNNER
 (7)ABLE SEAMAN (8)COMMANDER (9)MATE
 (10)CARPENTER (11)BOATSWAIN (12)COOK
 (13)BLACKSMITH (14)SAILMAKER (15)INTERPRETER
 (16)SAILOR (17)SHIP CAPTAIN
 (18)SLEDGE COMMAND (19)M.D.
 (20)COMMANDER'S ASSIST. (21)PROFESSOR
 (22)CHIEF ENGINEER (23)DOCTOR
 (24)SCIENTIFIC STAFF
 (25)MESSROOM BOY (26)OFFICER
 (27)PRIEST (28)SERGENT (29)SEAMAN
 (30)STEWARD (31)ARTILLARY SUBALTERN (32)COOK/
ACTLEVEL (1)SLEEPING (2)SITTING (3)LIGHT WORK
 (4)MEDIUM WORK (5)HEAVY WORK/
FOODSUP (1)ABUNDANT (2)SATISFACTORY
 (3)FAIR (4)STARVING (5)DEAD/
HEALTH (1)SATISFACTORY (2)FAIR
 (3)NEAR DEATH (4)DEAD (5)NO MENTION-ASSUME GOOD/
DRESS (1)NATIVE (2)EUROPEAN
 (3)HALF-HALF (4)UNIFORM
 (5)MADE THEMSELVES/
UPPER1,UPPER2
 (1)C-NON-SLIP-ANKLE
 (2)C-NON-SLIP-KNEE
 (3)C-NON-SLIP-HIP
 (4)C-NON-SLIP-WAIST
 (5)S-NON-SLIP-ANKLE
 (6)S-NON-SLIP-KNEE
 (7)S-NON-SLIP-HIP
 (8)S-NON-SLIP-WAIST
 (9)C-HOOD-SLIP-ANKLE
 (10)C-HOOD-SLIP-KNEE
 (11)C-HOOD-SLIP-HIP
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ONLY COPY AVAILABLE
SEULE COPIE DISPONIBLE

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(12)C-HOOD-SLIP-WAIST
(13)S-HOOD-SLIP-ANKLE
(14)S-HOOD-SLIP-KNEE
(15)S-HOOD-SLIP-HIP
(16)S-HOOD-SLIP-WAIST
(17)C-NON-FRONT-ANKLE
(18)C-NON-FRONT-KNEE
(19)C-NON-FRONT-HIP
(20)C-NON-FRONT-WAIST
(21)S-NON-FRONT-ANKLE
(22)S-NON-FRONT-KNEE
(23)S-NON-FRONT-HIP
(24)S-NON-FRONT-WAIST
(25)C-HOOD-FRONT-ANKLE
(26)C-HOOD-FRONT-KNEE
(27)C-HOOD-FRONT-HIP
(28)C-HOOD-FRONT-WAIST
(29)S-HOOD-FRONT-ANKLE
(30)S-HOOD-FRONT-KNEE
(31)S-HOOD-FRONT-HIP
(32)S-HOOD-FRONT-WAIST
(33)LSHIRT-SLIP-FUR
(34)LSHIRT-SLIP-LEATH
(35)LSHIRT-SLIP-WOOL
(36)LSHIRT-SLIP-COT-LINEN
(37)LSHIRT-SLIP-SILK
(38)LSHIRT-FRONT-FUR
(39)LSHIRT-FRONT-LEATH
(40)LSHIRT-FRONT-WOOL
(41)LSHIRT-FRONT-COT-LIN
(42)LSHIRT-FRONT-SILK
(43)SHTSLEEVE SHIRT
(44)SLEEVELESS VEST
(45)GUERNSEY FROCKET
(46)FROCK COAT
(47)WAIST COAT
(48)OVERCOAT
(49)GREAT COAT
(50)DRESS COAT
(51)LONG CLOAK
(52)SLEEVED CLOAK
(53)SHORT CLOAK
(54)CAPED OVERCOAT
(55)MACKINTOSH
(56)CHESTERFIELD OVERCT
(57)PEA JACKET
(58)PILOT COAT
(59)CAPED PALETOT
(60)REEFER
(61)INVERNESS CAPE
(62)ULSTER
(63)MILITARY COATEE
(64)MILITARY JACKET
(65)[illegible] NORFOLK JACKET
(66)ICELANDER (67)SNOWSHIRT-CALICO (68)PARKIE (69)DRESSES
(70)UNDERCLOTHING
(71)BIRDSKIN SHIRT (72)UNID SHIRT (73)MINISTER'S ROBE
(74)WOOLLEN CLOTHES (75)NATIVE DRESS (76)SEALSKIN JACKET
(77)BLUE CLOTH JACKET (78)BOX CLOTH JACKET
(79)CAPOT (80)BLANKET (81)FLANNEL SHIRT
(82)FROCK (83)SOUTH-WESTER
(84)SWEATER (85)JAEGER SWEATER
(86)GUERNSEY (87)JUMPER
(88)BEAR SKIN JACKET (89)SNOW JACKET
(97)NOT RELEVANT (98)NOT ASCERTAINED (99)UNDETERMINABLE/
LOWER1,LOWER2
(1)FUR PANTS-ANKLE
(2)FUR PANTS-MID-CALF
(3)FUR PANTS-KNEE
(4)LEATHER P-ANKLE
(5)LEATHER P-MID-CALF
(6)LEATHER P-KNEE
(7)CBREECHES
(8)CBREECHES-GAITORS
(9)GAITOR PANTALOONS
(10)STRAPPED PANTALOONS
(11)PANTALOON TROUSERS
(12)COSSACKS
(13)KNICKERBOCKERS-CAF
(14)KNICKERBOCKERS-ANK
(15)MOSCHETTOS
(16)TROUSERS-STRAIGHT
(17)TROUS-HALF-GAIT
(18)TROUS-FULL-GAIT
(19)TROUS-SIDEPIC
(20)GAITORS
(21)UNID PANTS-ANKLE (22)UNID PANTS-MIDCALF
(23)FBREECHES (24)SNOW PANTS-CALICO(25)TAIL FUR BANDS
(26)TUCKED IN FPANTS (27)TUCKED IN CPANTS
(28)MINISTER'S ROBE
(29)TUCKED UNID PANTS (30)NATIVE DRESS
(31)WOOLLEN GARMENTS (32)OVERTROUSERS
(33)BOX CLOTH TROWSERS (34)SAILOR PANTS
(35)BLUE CLOTH TROWSERS (36)KNITTED DRAWERS
(37)NAVY TROUSERS (38)UNID DRAWERS (39)1 PIECE OUTFIT
(40)CLOTH BREECHES (41)CHAMOIS DRAWERS
(42)BEARSKIN PANTS (43)BURBERRY HUNTING ST
(44)FLEECE SUIT (45)JAEGER SUIT (46)SILK OVERALLS
(47)COMBINATION SUIT
(50)OVERALLS (51)SEAL SKIN PANTS
(52)FOOTED TROWSERS (53)LONG STOCKINGS
(54)RED FLANNELS (55)FLANNEL UNDERWEAR
(56)DUCK PANTALOONS
(57)DUCK TROWSERS
(97)NOT RELEVANT (98)NOT ASCERTAINED (99)UNDETERMINABLE/
HANDGER1, HANDGER2
(1)GLOVES-WRIST (2)GLOVES-ELBOW
(3)MITTENS-WRIST (4)MITTENS-ELBOW
(5)LINERS) (6)OTHERS
(7)NOT RELEVANT (8)NOT ASCERTAINED (99)UNDETERMINABLE/
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CLOMAKER (1)UNID NATIVE
(2)MADE THEMSELVES
(3)GREENLAND ESK (4)MISS BILL-GRLD ESK
(5)LOUCHEAUX (6)MCGARY-KANE EXP
(7)JAEGER-LONDON (8)JAEGER-MONTREAL/
SHOEMAKE
(1)LEFFINGWELL (2)MIERTSCHING
(3)IND.WOMEN-FTGOODHOPE (4)UNID INDIAN WOMEN
(5)UNID WESTERN ESK WOMEN (6)UNID EASTERN ESK WOMEN
(7)EXPEDITION PERSONEL (8)REPAIRS THEMSELVES
(9)HOLSTEINBURG ESK (10)GUIDE'S FAMILY
(11)BOIS BRULEE WOMEN (12)SHOEMAKER ON SHIP
(13)UPERNAVIK ESK (14)ENG MANUFACTURER
(15)SHIP SHOEMAKER
(16)GRLD ESK ON SHIP (17)MISS BILL GRLD ESK
(18)KIRUK (19)MCKINLAY-KARLUK
(20)CHUKCHEE-SIBERIA (21)LOUCHEAUX
(22)AMER MANUFACTURER
(23)WHIPPLE-KANE EXP
(24)LAPP
(25)SIMPSON-ROG,PEET&CO
(26)NESSARK'S WIFE-GRLD (27)SAMOYEDE
(28)NORWEGIAN MANUF (29)DOG RIB
(30)JAEGER-MONTREAL (31)S.&H.BORBRIDGE
(32)CANADIANS
(99)UNID NATIVE/
UPMAT1, UPMAT2, SOLMAT1, SOLMAT2
(1)UNID SMOOTH LEATH
(2)UNID FUR (3)UNID FABRIC-FIBER
(4)RUBBER (5)WOOD
(9)HARE-RABBIT (10)FOX (11)ERMINE
(12)DEER (13)CARIBOU-REINDEER
(14)MOOSE (15)SEAL (16)WALRUS
(17)FISH (18)SEA LION (19)BEAR
(20)DOMESTIC WOOL (21)MT. GOAT WOOL
(22)COTTON (23)LINEN-FLAX
(24)JUTE (25)SILK (26)HEMP
(27)CORK (28)SHARK (29)NETTLES
(30)DOG (31)GRASS (32)SUEDE
(33)LAMBSKIN (34)CHAMOIS (35)ELASTIC
(36)UNID METAL (37)BEARDED SEAL-UGRUK
(38)GUTTA PERCHA (39)BUCKSKIN
(40)GOATSHAIR (41)BUFFALO/
UPPROC1, UPPROC2, SOLPROC1, SOLPROC2
(1)PLAIN KNIT (2)UNID KNIT (3)RIB KNIT
(4)KNIT VARIATION
(5)CROCHET (6)KNOT WORK (7)KNOTLESS NETTING
(8)BRAID (9)PLAIN WEAVE (10)TWILL
(11)DOUBLE WEAVE (12)REP WEAVE (13)BASKET WEAVE
(14)PILE WEAVE (15)UNID WEAVE
(16)FELTED (17)FELTED WEAVE (18)FELTED KNIT
(19)NAPPED WEAVE (20)WATERPROOFED FABRIC
(21)QUILTED (22)APPLIQUE (23)RAWHIDE
(24)UNIDTAN (25)PHOSPHATIDE-BRAIN
(26)FISH-SEALOIL-TAN (27)SMOKED (28)IRON TAN
(29)ALUM TAW (30)CHROMIUM TAN (31)ZIRCONIUM
(32)ALDEHYDE TAN (33)SEMI CHROME (34)PICKLE CURE
(35)UNID  TAN (36)HEMLOCK-VEG (37)OAK VEG (38)DRYING
(39)CHEWING (40)CANVAS (41)CHAMOIS (42)TICHEN
(43)SUEDE (44)MILLED (45)BOX CLOTH (46)FLANNEL
(47)COATED.FABRIC (48)WORSTED (49)WADMIL
(50)WATER SKIN SEAL
(51)PUP SEAL (52)SAIL CLOTH
(53)UNID DYE (54)SPUN-SINGLE PLY
(55)BLANKET CLOTH (56)SCAPING
(57)PROCESSED LATEX (58)WATER SOAKING
(59)UNID OIL TAN (60)DUFFLE/
LINING (0)NONE (1)ATTACHED SOCK (2)FABRIC
(3)FUR (4)SMOOTH LEATHER (5)DOUBLED/
THREDMAT (0)NONE (1)COTTON (2)LINEN
(3)HEMP (4)SINEW (5)OTHER/
SEWTECH (0)NONE (1)HAND ONLY
(2)HAND&MACHINE (3)MACHINE ONLY/
FASTEN1, FASTEN2 (0)NONE (1)STRAP-BUCKLE (2)STRAP-
BUTTON (3)STRAP-TIE (4)LACE-FRONT
(5)LACE-SIDE (6)LACE-BACK
(7)LACE-HOLES-EYELETS (8)ANKLE TIE
(9)DRAWSTRINGS (10)HOOKS-EYES
(11)ELASTIC (12)ZIPPER
(13)SIDE BUTTONS (14)FRONT BUTTONS
(15) THONGS (16)CANVAS STRAP
(17)LEATHER LACE/
TONGUE (0)ABSENT (1)PRESENT/
SOLELOC (0)ONEPIECE CONST
(1)BASE FOOT-SOFT (2)BASE FOOT-HARD
(3)TOP FOOT-SOFT (4)TOP FOOT-HARD
(5)SOLE PRES-NO INFO (6)OTHER/
SOLEMETH (1)SEWN (2)PEG (3)NAILED
(4)BONDED (5)COMBINATION (6)OTHER/
HEITLEG (0)BELOW ANKLE (1)ANKLE (2)MID-CALF
(3)KNEE (4)THIGH (5)HIP
(6)WAIST OR ONE-PIECE/
PANTSIN (0)NO PANTS (1)SHORTER THAN BOOT
(2)TUCKED IN (3)OVER BOOT/
TOESHAPE (1)SQUARE (2)ROUND (3)OVAL (4)POINTED
(5)RAISED (6)OTHER/
SOLSHAPE (1)STRAIGHTS (2)RIGHT-LEFT/
SOLTHICK (1)THICK-CAN'T MEAS (2)THIN-CAN'T MEAS
(99)ADDED-SPIKES/
HEELHEIT (0)HEEL ABSENT (1)PRESENT-CAN'T MEASURE
(2)FRAG-ASSUME PRES/
INERBOOT (0)NONE (1)EUROPEAN SOCK
(2)COPY OUTER BOOT (3)PIECED (4)SEWED-NOTBOOTSHAPE
(5)NO SEWING-WRAPPER (6)OTHER OR PRES/
COLOR1, COLOR2 (0)NATURAL MATERIAL (1)BLACK-BROWN-TAN-WHITE
(2)REDS DOMINANT (3)BLUES-GREENS (4)YELLOWS
(5)2 COLOR COMB (6)3 OR MORE COMB/
DECOR1,DECOR2,DECOR3 (0)NONE
(1)BEADED-WRAPPED (2)BEAD NETTING
(3)BEAD-SPOT STITCH (4)BRAIDING (5)BRAID EMBROIDERY
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